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Alaska Department of Fish and Game
Division of Commercial Fisheries
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Stock Compositions of Sockeye Salmon Catches in Southeast Alaska's Districts 106 and 108 and in the Stikine River, 1987, Estimated with Scale Pattern Analysis

by
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and
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State of Alaska Steve Cowper, Governor

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ABSTRACT

Linear discriminant function analysis of scale patterns was used to estimate the 1987 sockeye salmon (*Onchorynchus nerka*) stock compositions in the commercial gill net fisheries in Southeast Alaska's Districts 106 and 108, in the Stikine River test fishery, and in the Canadian lower river commercial fishery. Contributions of the Alaska I, Alaska II, Canadian Nass/Skeena, and transboundary Stikine River stock groups to Alaska's District 106 and 108 fisheries were estimated to be 66,541, 46,043, 21,190, and 3,655 sockeye salmon, respectively. The commercial fishery stock specific weekly CPUE is an indicator of migratory timing. The CPUE in District 106 was greatest July for the Alaska I stock group, during late July through early August for the Alaska II group, and during early August for the Nass/Skeena group. Weekly catches of the Tahltan and non-Tahltan Stikine River stocks were too small to be used to estimate migratory timing. Canada's Stikine River commercial and food fishery catches were estimated to be 4,509 Tahltan and 5,106 non-Tahltan Stikine fish, while estimated escapements were 6,958 Tahltan and 17,055 non-Tahltan Stikine fish. The 1987 Stikine River sockeye run was estimated to be 33,628 fish. An additional 603 Tahltan and 1,355 non-Tahltan Stikine sockeye salmon were caught in district and inriver test fisheries. Tahltan stocks contributed more than 65% of the weekly Canadian commercial catch through July 18, while the non-Tahltan Stikine stocks contributed more than 75% of the weekly catch after July 19. In-season estimates of stock proportions, used to provide guidelines for managers in making fishery extension or closure decisions were not significantly different from post season estimates during most weeks.

KEY WORDS: sockeye salmon, linear discriminant function, scale pattern analysis, stock composition, transboundary, migratory timing, in-season analysis, Stikine sockeye, Tahltan, non-Tahltan Stikine, *Oncorhynchus nerka*

INTRODUCTION

Sockeye salmon (*Oncorhynchus nerka*) are harvested in marine net fisheries throughout Southeast Alaska and northern British Columbia. Drift gill net fisheries in Alaska's commercial fishing Districts 106 and 108 harvest sockeye salmon of Alaskan origin, but also catch some sockeye salmon of transboundary Stikine River origin and some fish destined to spawn in the Nass and Skeena Rivers of Canada. Interception of salmon bound for one country's rivers as they migrate through the territorial waters of the other country has become a research and management concern in recent years with the implementation of the U.S./Canada Pacific Salmon Treaty. Cooperative international management of Stikine River sockeye salmon is mandated by this treaty under Annex IV, Chapter 1. Knowledge and control of stock-specific harvest is, therefore, needed to fulfill requirements of and assess compliance with the harvest sharing guidelines outlined in the treaty.

Objectives

The purpose of this study is to determine the contributions of major sockeye stock groups to: (1) gill net fisheries in Alaska's Subdistricts 106-41 and 106-30 and District 108, (2) Canada's commercial fisheries in the Stikine River, and (3) the Stikine River test fishery. This study provides in-season information on the abundances of local sockeye stocks that is used by managers in making harvest level decisions. Postseasonally it provides revised estimates of stock composition which are used to finalize estimates of stock compositions. An estimate of the total Stikine River sockeye run is derived from data analyzed in this study. Estimation of the interception rates and relative abundance of Stikine River sockeye salmon is of major importance in helping managers from the Alaska Department of Fish and Game (ADF&G) and the Canadian Department of Fisheries and Oceans (CDFO) implement treaty guidelines.

Study Area

Sockeye salmon harvested in the Districts 106 and 108 commercial fisheries originate from lake systems and their tributaries throughout Southeast Alaska, from the sloughs and lakes of the transboundary Stikine River, and from the Canadian Nass and Skeena Rivers (Figure 1). Tagging studies have shown that few stocks from other than the above areas pass through District 106 (Steve Hoffman, Alaska Department of Fish and Game, personal communication). In the above studies adult sockeye salmon were tagged in 1982 and 1983 in several Alaskan and Canadian fishing districts to determine migratory pathways and interception rates of various stocks. The majority of terminal area recoveries from fish tagged in District 106 occured along the northeast coast of Prince of Wales Island and upper Behm Canal. Tags applied in this district were also recovered in Alaskan systems as far south as the U.S./Canada border, and in the Stikine, Nass, and Skeena Rivers. There were few or no recoveries of tags applied in more

southern districts in either the northern Prince of Wales Island lake systems or the Stikine River.

Numerous sockeye salmon producing lakes are scattered throughout the achipelago and mainland of Southeast Alaska. They range in size from small lakes of a few hectares to large systems greater than 500 hectares (e.g., McDonald and Klawock Lakes) and include multi-lake systems like the Sarkar and Galea-Sweetwater complexes (Figure 2). Sockeye salmon production is limited by the quantity and quality of spawning areas, the available rearing area, or other environmental conditions as well as the number of spawners. Sockeye productivity varies greatly, even among systems of roughly equivalent size (McGregor 1983; McGregor et al. 1984; McGregor and McPherson 1985; McPherson and McGregor 1986; and McPherson et al. 1988a, 1988b). Typical small systems, such as Alecks and Kutlaku Lakes on Kuiu Island, produce estimated runs of a few thousand fish. While total run size is not known escapements in two intermediate systems, which had enumeration weirs, Karta Lake on eastern Prince of Wales Island and Salmon Bay Lake on northeast Prince of Wales Island averaged 21,500 and 15,300 sockeye salmon (1982 to 1987, excluding 1984 for Karta when a weir was not installed). The single largest producer of sockeye salmon in recent years in southern Southeast Alaska has been McDonald Lake, located in upper Behm Canal. Escapements to this system have ranged from 56,000 in 1983 to 175,000 in 1987 and averaged 119,000 (1981 to 1987, excluding 1982 when the weir washed out).

The Stikine River is a transboundary river that originates in British Columbia, crosses the Alaskan panhandle, and flows into Frederick Sound north of Wrangell. Approximately 90% of the river system is inaccessible to anadromous fish due to natural barriers and velocity blocks. The majority of the accessible sockeye spawning habitat is located above the U.S./Canada border. The largest single contributor to the Stikine River sockeye run is the Tahltan Lake group, hereafter referred to as Tahltan. This system has a weir and sockeye escapement counts have ranged from 1,800 fish in 1963 to 67,300 fish in 1985 and averaged 20,600 (1959 to 1987, excluding 1962 when the weir installation date was unspecified and 1965 when a large slide hindered access into the lake) (TTC 1987). The remainder of the Stikine River sockeye stocks (the non-Tahltan Stikine stock group), spawn in small lakes, sloughs, and side channels of the mainstem river and its tributaries, most of which are glacially occluded. Non-Tahltan Stikine sockeye escapement estimates have ranged from 13,400 in 1979 to 63,000 in 1985 and averaged 32,200 (1979 to 1987). A Canadian subsistence fishery operating near Telegraph Creek has harvested a yearly average of 3,525 fish (1972 to 1987) (CDFO 1986; Sandy Johnson, CDFO, personal communication). Canadian commercial fisheries on the upper and lower portions of the river have harvested an average of 832 and 14,638 sockeye salmon, respectively (1979 to 1987, excluding 1984 when both were closed).

The Nass and Skeena Rivers also contribute substantial numbers of sockeye salmon to the District 106 and 108 harvests in some years. The Nass River originates in British Columbia and drains into Portland Canal, just south of the U.S./Canada border. Estimated sockeye escapements to this system have averaged 227,400 from 1980 to 1987. The Skeena River also originates in British Columbia and drains into the ocean about 50 km south of the Nass

River. Estimated sockeye escapements have averaged 1,158,800 from 1980 to 1986 (TTC 1988; Barbara Snyder, CDFO, personal communication).

Stock Separation Studies

The United States and Canada inititated research programs in 1982 to assess the feasibility of various stock separation techniques applicable to sockeye salmon stocks harvested by both countries. Several methods of stock separation have been used, including: the incidence of the parasite *Myxobolus neurobius*, differences in genotypes, adult tagging studies, and scale pattern analysis. Of these, scale pattern analysis has been used most extensively to determine stock composition of the harvests in Alaskan mixed stock commercial fisheries (Oliver et al. 1984; Oliver and Walls 1985; Oliver and Jensen 1986; Jensen et al. 1988).

Scale pattern analysis has proven highly successful in determining the contribution rates of sockeye stocks to Southeast Alaska's commercial fisheries because of significant and persistent differences in the freshwater and early marine growth among stocks originating in various Alaskan and Canadian systems. The original stock groupings used by ADF&G were the Alaska group (comprised of samples taken from 22 to 28 Alaska escapements), Nass/Skeena group (comprised of samples taken from inriver test fisheries on the Nass and Skeena Rivers), and Stikine River group (comprised of scale samples collected from the Canadian inriver commercial fishery). The stock groupings were expanded in 1983 by creating separate standards for the Tahltan Lake escapement and for the non-Tahltan Stikine escapement (samples from mainstem river and side slough spawners and Chutine, Skud, and Iskut River spawners). Standards were further refined in 1986 to separate two distinct Alaska patterns (Alaska I, typified by Salmon Bay and Hugh Smith Lake patterns and Alaska II, typified by the McDonald Lake pattern). The 1987 standards were created in the same manner as in 1986.

MATERIALS AND METHODS

Collection and Preparation of Scale Samples

One to three scales were taken from each of 700 sockeye salmon randomly sampled from the commercial catches in Alaska's Subdistricts 106-41 and 106-30 during each week the fisheries were open and in District 108 from one week (mid-July, week 29) only (McPherson et al. 1988b). Scale samples from the Stikine River test fishery and from the Canadian commercial catch were collected by ADF&G and CDFO personnel. Stock group standards used in postseason analysis were developed from scales sampled from 1987 escapements. Approximately 500 scales were collected from each of 16 lake systems throughout Southeast Alaska (Figure 2), 1000 scales at the Tahltan weir (Figure 3), 200 from non-Tahltan Stikine escapements, and approximately 1000 to 1500 from each test fishery operating in the lower reaches of the Nass and Skeena Rivers (Figure 1). The standards used in the

in-season analysis were developed from scales collected in the same areas in 1986.

Scales were taken from the left side of each fish approximately two rows above the lateral line in the area transected by a diagonal line between the posterior insertion of the dorsal fin to the anterior insertion of the anal fin (INPFC 1963). Scales of salmon fry develop first in this area, and thus, for purposes of aging and digitizing, it is the prefered area. Scales were mounted on gum cards and impressions made in cellulose acetate (Clutter and Whitesel 1956).

Age Determination and Measurement of the Scales

A sampling goal of scales from 700 fish per district per week was established for the age composition estimation. Individual fish ages were determined from scale images magnified 70X on a microfiche reader and were recorded in European notation. The sample size used for the scale pattern analysis varied on a weekly basis and was dependent on age composition. Generally scales from 100 age-1.3 fish and as many scales as possible (up to 100) from each of the age-1.2, -2.2, and -2.3 groups were analyzed for each district or subdistrict and week (Appendix A.1 and A.2). Scale images magnified at 100X were projected onto a digitizing tablet using equipment similar to that described by Ryan and Christie (1976). Scale measurements were made and recorded with a microcomputer-controlled digitizing system with fortran programs.

Previous studies have established that an axis approximately perpendicular to the anterior edge of the unsculptured posterior field is best for consistently measuring sockeye scales (Clutter and Whitesel 1956; Narver 1963). This axis is approximately 20° dorsal or ventral from the anterior-posterior axis, and all circuli counts and scale measurements in the lacustrine and first year marine zone were made along it. Marshall et al. (1984) established the separability of major stock groups by measurements in three (or four) zones: (1) the scale center to the last circulus of the first freshwater annulus, (2) when present, the first circuli of the second year of freshwater growth to the end of the second freshwater annulus, (3) the plus growth or scale growth after the last freshwater annulus and before the first marine circulus (Mosher 1968), and (4) the first year marine growth (i.e., the first marine circulus to the end of the first marine annulus) (Figure 4). A total of 74 variables, including circuli counts, incremental distances, and ratios and/or combinations of the measured variables are calculated for samples with a single freshwater annular zone and 106 variables for samples with two freshwater annular zones (Appendix A.3).

Analytical Procedures

The ability to differentiate salmon stocks based on scale patterns depends upon the degree of difference in the scale characters among stocks (Marshall et al. 1987). Linear discriminant function (LDF) analysis of

scale patterns has been used to estimate stock contribution to southern Southeast Alaska mixed stock sockeye salmon fisheries since 1982 (Oliver et al. 1984; Oliver and Walls 1985; Oliver and Jensen 1986; Jensen et al. 1988).

LDF is a multivariate technique that is used to develop classification rules used to assign a sockeye salmon sampled in a mixed stock fishery to a stock of origin. The variables calculated from the circuli counts and incremental distances on scales from fish of known origin provide a set of measurements used to define these rules. A sample of p selected scale variables from a number of salmon stocks or stock groups defines a single region in *p-space* characteristic of that group of fish. Based on probability theory, the established regions in *p-space* are uniquely defined or separated by decision surfaces. A sockeye salmon harvested in a mixed stock fishery may be classified according to which region its *p-tuple* occupies. The accuracy of classification depends upon the precision with which the regions defining each stock or group are described and the inherent separation between them. The LDF is the linear combination of p observed variables which maximizes the between-group variance relative to the within-group variance (Fisher 1936).

The major assumptions underlying LDF analysis are: (1) the groups being investigated are discrete and identifiable; (2) the parent distributions of the measured variables are multivariate normal; and (3) the variance-covariance matrices for all groups are equal. Gilbert (1969) found LDF satisfactory if the variance-covariance matrices were not too different from each other. Large sample sizes appear to make the LDF robust to the assumption of common variance-covariance matrices (Issacson 1954; Anas and Murai 1969). The method also appears to be robust to violations of the normality assumption for discrete distributions, however, it is not robust for continuous non-Gaussian parent distributions (Lachenbruch et al. 1973; Krzanowski 1977).

The 2 to 10 scale variables to be used in the LDF are selected from among 106 variables using a stepwise regression procedure (Enslein et al. 1977). In this process variables are added until the partial F-statistic of each variable not yet entered into the model is less than 4.00. An almost unbiased estimate of classification accuracy for each LDF was determined using a leaving-one-out procedure (Lachenbruch 1967). One sample is "left-out", the discriminant rule is estimated, and the "left-out" sample is classified using the discriminant rule and checked to see if it was classified correctly. This procedure is repeated for all samples. Thus, when an LDF is run using the leaving-one-out procedure, a classification matrix is developed which gives the proportion of correctly identified fish and the proportion of misclasification of each stock to each of the other stocks.

When more than two stock groups are being analyzed, the stepwise regression procedure does not always result in maximum classification accuracies or the most balanced classification matrix. Frequently, well-separated groups are separated even further, while poorly separated groups remain poorly separated (Habbema and Hermans 1977). Scale variables that provided the best discrimination between the groups (high F value) that most often misclassified as each other were occasionally added to or substituted for

other variables used in the LDF to provide either a better balance to the classification matrix, or to increase the mean classification accuracy.

The estimates of stock composition proportions in the mixed stock harvests, referred to as initial estimates, were adjusted with a classification matrix correction procedure (Cook and Lord 1978). The fish in the mixed stock composition sample are classified with the LDF. The vector of estimates for each stock or stock group is multiplied by the classification matrix to give new estimates, referred to as adjusted estimates, for the true proportions of stocks and stock groups in the mixed stock fishery. In cases where adjusted estimated proportions for a stock group were less than zero, the entire catch sample was reclassified with a model excluding that stock group. This process was repeated until all adjusted estimated proportions were positive.

The variance and 90% confidence intervals of the adjusted estimates of stock proportions were computed according to Pella and Robertson (1979). The variance-covariance matrices for the misclassification matrix and for the mixed stock proportion vector are determined from the multinomial probability distribution. These two variance-covariance matrices are combined to give variances and covariances for the adjusted estimates of stock proportions. The variances for the proportions of each stock are the diagonal elements of this combined matrix, i.e., they are an additive combination of: (1) the sampling variation in estimation of the probability of assignment of the known stock group, and (2) the sampling variation in estimation of the assignment composition of the mixed stock group.

Developing Standards

The four major age groups (1.2, 1.3, 2.2, and 2.3) have generally contributed more than 98% of the catch in Districts 106 and 108. Standards were developed for each age class for the Alaska I and Nass/Skeena groups and for age-1.2, -1.3, and -2.3 fish for the Alaska II group. Tahltan standards were developed for age-1.3 and -2.3 fish and non-Tahltan Stikine standards were developed for the age-1.3 fish only. Standards were not developed for age classes which contributed only a minor fraction of the escapement for a given stock or stock group since insufficient scales were available to build them. Age-specific models, where standards from age-1.3 fish were used to classify catches of age-1.3 fish, were used in the analysis to: (1) account for differences in age composition among stocks, (2) remove potential bias due to differences in migratory timing of different age fish, and (3) eliminate the effect of different environmental conditions on the scale patterns of different age fish.

Classification of Catches

Commercial catches were analyzed in-season with standards developed from the previous year's escapements. Stock contributions for the Subdistrict 106-41 and 106-30 and for one week of the District 108 commercial harvests were estimated and summaries provided to managers within 48 h of the

fishery closures from mid-June through early August. Three of the four major age groups (1.2, 1.3, and 2.3) were analyzed; the fourth, age-2.2, comprized primarily of the Alaska I and Nass/Skeena stocks was not digitized in-season due to time constraints. Stock compositions for the Canadian commercial catches on the Stikine River were also estimated in-season, however, there was a 3- to 5-d lag between fishery closures and catch analyses due to logistical difficulties in receiving the data. The commercial catches were reclassified postseasonally with standards built from the 1987 escapements. Commercial catches which had occured after the cessation of the in-season analysis and catches from the Stikine River test fishery were also classified postseasonally.

Stock contributions were estimated for each week to track temporal patterns; however, in some weeks catches were small and samples of the less common age groups were insufficient to classify, unless pooled with the adjacent week's sample. The proportion of each stock in a week's catch sample was expanded to the week's catch by:

$$C_{ijt} = C_t * P_{it} * S_{ijt} \quad (1)$$

where: C_{ijt} = estimated catch of fish of age i and group j in time period t

C_t = total catch in time period t,

P_{it} = estimated proportion of fish of age i in the catch in time period t, and

S_{ijt} = proportion of fish of age i and group j in the catch in time period t estimated with LDF.

The stock apportionment of the minor age groups not classified with LDF assumes that the proportion of the minor ages belonging to any given stock is equal to the combined proportion of all LDF classified age classes:

$$C_{mjt} = C_t * P_{mt} * S_{.jt} \quad (2)$$

where: C_{mjt} = estimated catch of fish of minor age classes of group j in time period t and

P_{mt} = estimated proportion of fish of minor age groups in the catch in time period t.

$S_{.jt}$ = proportion of fish in all age classes in group j in the catch in time period t estimated with LDF.

Sockeye catches in Alaska's District 108 were sampled during mid-July only (statistical week 29). The contributions of Stikine River stocks in each unsampled week in 1987 were estimated by averaging the contributions of Stikine River stocks during the same week during prior years based on

hypothesis test of no significant difference between years (Table 1). No variances were calculated for stock compositions estimated in this manner.

The variances (V) of the weekly ($C._{.jt}$) and seasonal ($C._{.j.}$) stock composition estimates were approximated with the delta method (Seber 1982). The variance estimates are functions of: (1) The accuracy of the age-specific models used to classify the unknowns, (2) the sample size of each standard used to develop the age-specific models, (3) the proportions of each stock in the initial and in the adjusted stock composition estimates, (4) the age-specific stock composition sample sizes, (5) the age composition sample sizes, and (6) the catch size. However, it is a minimum estimate of variance since it does not include any variance associated with the age classes not classified with LDF, any variance for stocks contributing no fish during a given week, nor any estimator of aging errors.

Variances of the proportions of stock contributions were calculated by

$$V(P_j) = P_j^{\,2} * \left(\frac{V(C_j)}{C_j^{\,2}} + \frac{V(C.)}{C.^{\,2}}\right) \qquad (3)$$

where: P_j = Proportion of stock j or $C_j/C.$

The postseason classifications of the Stikine River commercial and test fishery catches were run with 2-way Tahltan versus non-Tahltan Stikine models for age-1.2, -1.3, -2.2, and -2.3 fish. All age-0. fish were assumed to be of non-Tahltan Stikine origin since no age-0. fish have been found in samples from Tahltan weir.

Estimation of the Stikine River Sockeye Run

The weir counts at Tahltan weir added to the number of Tahltan fish in the inriver sockeye salmon catches were used to estimate the total inriver run of Tahltan fish. A drift and set gill net inriver test fishery, operated by CDFO and ADF&G personnel, was located just above the U.S./Canada border (Figure 3). The CPUE of the drift gill net test fishery was used to estimate migratory timing, while stock composition was estimated from the combined catches of the drift and set test nets. The magnitude of the inriver run of the non-Tahltan Stikine stock group was estimated by mulitiplying the inriver run of Tahltan fish by the proportion of non-Tahltan fish in the test fish catch and dividing the sum by the proportion of Tahltan fish in the test fishery catch:

$$R_{1.} = \frac{R_{2.} * P'_{1.}}{P'_{2.}} \qquad (4)$$

where: $R_1.$ = run size of non-Tahltan Stikine fish past the Canadian inriver test fishery,

$R_2.$ = run size of Tahltan fish past the Canadian inriver test fishery,

$P'_1.$ = adjusted proportion of non-Tahltan Stikine fish in the season's test fishery catch, and

$P'_2.$ = adjusted proportion of Tahltan fish in the season's test fishery catch. note $P'_2. = 1 - P'_1.$

and:

$$P'_{jt} = P_{jt} * \frac{C_t}{\sum_{t=1}^{N} C_t} \qquad (5)$$

where: P'_{jt} = adjusted proportion of total sockeye run belonging to stock j and occurring in week t,

P_{jt} = proportion of stock j in week t from test fishery catch analysis,

C_t = CPUE from test fishery in week t, and

N = number of weeks in fishing season.

The test fishery effort was 60 drifts per week in all weeks, except early August (week 32) when the effort was 50 drifts. The catch in week 32 was standardized to the level of other weeks by multiplying by 60/50.

Comparison of In- and Postseason Estimates

Adjusted in-season and postseason weekly stock composition estimates for Subdistricts 106-41 and 106-30 and for the Stikine River were compared to test whether the in-season estimates differed significantly from the postseason estimates for each fishery. The actual numbers of fish in the sample which were classified to each group in the in-season analysis were compared to those in the postseason analysis. Only the ages done in-season were compared. However, in some weeks time was insufficient to digitize a full sample in-season, and thus, the number of fish used in the postseason analysis was larger than that used in-season. Data was set up in a standard contingency table format and tested with the G statistic (log-likelihood ratio test) (Zar 1984).

RESULTS

The stock compositions of the sockeye salmon caught in Districts 106-41, 106-30, and 108 and in the Stikine River were estimated from mid-June through late September (statistical weeks 25 to 39). Of the 138,047 sockeye salmon harvested in Districts 106 and 108, 48% were of Alaska I origin, 34% of Alaska II, 15% of Nass/Skeena, 1% of Tahltan, 1% of non-Tahltan Stikine, and 1% of additional Stikine (combined) origin (Table 2). Of the Canadian lower Stikine River commercial catch of 6,138 (DFO 1987), 31% were of Tahltan and 69% were of non-Tahltan Stikine origin (Table 3). Model accuracies, determined from classification matrices (Appendix B), ranged from a low of 67% for the five-standard model to a high of > 90% for some of the two standard models (Table 4). The Alaska I and Alaska II groups tended to misclassify as each other, as did the Stikine, Tahltan and Nass/Skeena groups. In most models the Alaska II and Nass/Skeena groups had the lowest and the non-Tahltan Stikine standard had the highest misclassification rates. The in-season stock composition estimates were not significantly different from the post season estimates in most weeks.

Stock Composition of the Subdistrict 106-30 Catch

Stock composition by age class was estimated for the Subdistrict 106-30 sockeye harvest (Table 2). Of the estimated 57,262 sockeye salmon harvested in the drift gill net fishery in 1986, 84% were of Alaska I and Alaska II origin, 14% of Nass/Skeena origin, and 1.6% of transboundary Stikine River origin (combined from Appendix C.1). The peak harvests of Alaska I fish occured in early to mid-July; Alaska II fish peaked in mid-July to early August, and Nass/Skeena fish in early August (Figure 5). The Tahltan and non-Tahltan Stikine groups were only minor components with estimated contributions of 221 and 710 fish, respectively. The Alaska I group was harvested throughout the season and contributed >50% of the catch during mid-June through mid-July (weeks 26 to 29) (Figure 6). The Alaska II group dominated the catch in late July and early August, while the Nass/Skeena group comprised 10 and 20% of the catch throughout the season.

The CPUE (catch per boat day) of the Alaska I group was greater than 60 fish in early and mid-July (weeks 28 and 30). The peak CPUE of 74 Alaska II and 25 Nass/Skeena fish per boat day both occured during late July (week 31) (Appendix C.2). The weekly proportion of CPUE by group indicated that the migratory timings of the Alaska II and the Nass/Skeena groups were similar to each other and later than the Alaska I group in Subdistrict 106-30 (Figure 7). Little can be learned of the migratory timing of the Tahltan and non-Tahltan Stikine groups through the Subdistrict 106-30 fishery because of the extremely small catches of these stocks. A rough estimate of the migratory timing of the Stikine River sockeye stocks may be gleaned by combining data from this and previous years' stock composition estimates (Appendix D.1-4). Catches of the Tahltan group peak during late June-early July, while catches of the non-Tahltan Stikine group peak from mid-July to early August.

Stock Composition of the Subdistrict 106-41 Catch

Of the estimated 79,165 sockeye salmon harvested in Subdistrict 106-41 in 1987 (Table 2), 82% were of Alaska I and Alaska II origin, 17% of Nass/Skeena origin, and 1.8% of transboundary Stikine River origin (combined from Appendix C.3). Classifications were determined for each age class (Appendix C.3). The harvests of the Alaska I, Alaska II, and Nass/Skeena groups peaked mid-July, late July through early August, and early August, respectively (Figure 8). Stikine River stocks contributed only a small portion of the catch with the Tahltan contribution estimated at 1.5% and the non-Tahltan Stikine at 0.3%. Neither group contributed >1000 fish in any week, and no Stikine River fish were harvested after late July (week 30). The Alaska I group dominated the catch from mid-June through early July when they comprised an estimated 43-75% of the weekly catch and remained an important contributor through the remainder of the season (Figure 9). The Alaska II and Nass/Skeena groups comprised from 15-50% and 8-33%, respectively, of the weekly catches.

The estimated peak CPUE (catch per boat day) occured in mid-July (week 30) for the Alaska I, Alaska II, and non-Tahltan Stikine groups, in early July (week 28) for the Tahltan, and in early July and early August (weeks 28 and 32) for the Nass/Skeena groups. Peak CPUE's of 80, 61, and 34 fish for Alaska I, Alaska II, and Nass/Skeena, respectively, were much greater than those of Tahltan and non-Tahltan Stikine at 5 and 2 fish, respectively (Appendix C.4). The weekly proportion of CPUE, an indicator of migratory timing, peaked for all groups combined during mid-July (week 30), but, that of the individual groups all peaked in other weeks (Figure 10).

Stock Composition of the District 108 Catch

An estimated 37 fish of Alaska I, 14 of Alaska II, 0 of Nass/Skeena, 126 of Tahltan, 122 of non-Tahltan Stikine, and 124 fish of unknown origin were harvested in District 108 during mid-July (week 29) (Appendix C.5). The harvests during mid-June through early July (weeks 26-28) were estimated at 1063 Stikine combined and 134 Alaska combined.

Stock Composition of the Stikine River Catches

Stock contributions were estimated by age class for the Canadian commercial sockeye harvest in the lower Stikine River. The contributions of the Tahltan and non-Tahltan Stikine stock groups to the 6,138 drift and set gill net fishery harvest (Sandy Johnson, CDFO, personal communication) were estimated at 22.5% and 77.5% of the catch, respectively (Table 3 and Appendix E.1). Tahltan fish dominated the catch through mid-July (week 29) and non-Tahltan fish contributed the majority of the harvest after mid-July (week 30) (Figure 11).

A peak commercial catch per fishing day of 72 sockeye salmon occurred during early August (week 32) (Appendix E.2). The peak CPUE (catch per

fishing day) for Tahltan fish occured during mid-July (week 29) and that for non-Tahltan in early August (week 32).

Of the 1,667 sockeye caught in the Stikine River drift and set net test fishery an estimated 513 (30.8%) were of Tahltan and 1,154 (69.2%) were of non-Tahltan Stikine origin. As in the commercial catch, Tahltan fish dominated the catch through mid-July and non-Tahltan fish comprised the majority of the weekly catch thereafter (Table 3 and Appendix E.3) (Figure 12).

The peak standardized (60 drifts/week) test fish catch of 100 sockeye salmon occured in late July (week 30). The Tahltan group peaked in early July with 43 fish/drift week and the non-Tahltan group peaked in late July with 72 fish/drift week (Appendix E.4). The Tahltan group had a more compacted migratory timing than did the non-Tahltan fish (Figure 13.)

Stikine River Run Strength

Adjusted weekly proportions of Tahltan and non-Tahltan fish in the run were estimated using weekly proportions in the test fishery catch weighted by migratory timing determined from test fishery CPUE, as shown in equation (5). Summed over all weeks, this resulted in a total proportion of 0.341 Tahltan and 0.659 non-Tahltan fish in the inriver sockeye run (Appendix E.4). The total Canadian catch of Tahltan fish was 4,509 and the weir count for Tahltan escapement was 6,958, giving a Tahltan inriver run estimate of 11,467 (Table 5). These numbers, input into equation (4) provide an estimate of 22,161 for the non-Tahltan Stikine inriver sockeye run. The total sockeye salmon inriver run was therefore, 33,628 fish, which, combined with the catch of 3,655 Stikine River fish in Alaska's Districts 106 and 108 indicated a total Stikine River run of 37,283 sockeye salmon. The 90 Tahltan and 201 non-Tahltan fish caught in Alaska's District 106 and 108 test fisheries and the 513 Tahltan and 1154 non-Tahltan fish caught in the inriver test fisheries are not included in the above totals.

Comparison of In-season and Postseason Analysis

The in-season stock composition estimates were not significantly different from the postseason estimates (log-likelihood ratio analysis with α = 0.05)(Table 6 and Appendix F). The in-season estimates did not differ significantly from the postseason estimates during late June and early July (weeks 26 and 28) in Subdistrict 106-30. In all weeks the in-season analysis indicated a greater relative abundance of the Alaska I group and a lesser relative abundance of the Alaska II group than did the postseason analysis (Appendix F.3). The in- and postseason estimates were not signigicantly different from late June through late July (weeks 27-30) in Subdistrict 106-41. However, as in Subdistrict 106-30, the inseason estimates of the Alaska I group were higher and of the Alaska II group were lower than the postseason estimates (Appendix F.7). There were no significant differences between the in- and postseason analyses of the Stikine River commercial catch.

DISCUSSION

Although the total sockeye catch in District 106 was close to the 1982-1986 average of 141,866 fish, the stock composition was substantially different from that of previous years (Appendix D). The actual and relative contribution of the Alaska groups to the harvest was the second highest and highest, respectively, since scale pattern analysis was initiated in 1982. As in 1986 a strong run of McDonald Lake fish was an important factor in the high contribution of the Alaska stocks. This stock has been exceedingly productive in recent years (1981-1987).

The stock composition of the District 108 sockeye catch could not be estimated by weekly samples expanded to catches since the catch was sampled only during mid-July (statistical week 29). An alternate method was developed since 71% of the catch, 1197 of 1690 fish, occurred before this time (statistical weeks 26-28). The commercial catch was sampled during this early period in 1986, and the test fishery catches in 1985 and 1986. Contributions of the individual stock groups were significantly different between years for a given week, however, the proportion contributed by the Stikine River as a whole (Stikine combined = Tahltan + non-Tahltan Stikine) was fairly constant. The relative weekly abundance of Stikine River fish in the sockeye catch was higher in 1985 than 1986, however, differences were not significant between years for weeks 25, 26, and 29 with log-likelihood ratio analysis, $\alpha = 0.05$ (Table 1). Differences were significant during weeks 27 and 28, however, the total catches were small and the actual differences would have been <200 fish per week if the catches in 1986 had been as large as in 1985. Weekly interyear differences were either not significant or numerically small during 1985 and 1986 and for the one sampled period in 1987. Therefore, the contributions of Stikine River stock in each unsampled week in 1987 were estimated by averaging the contributions of Stikine River stocks during the same week during the other years. Based on the stock compositions in previous years, the remaining fish were most likely of Alaska I origin.

Both the actual and relative contribution of the Stikine River stocks to the harvest in Alaska's Districts 106 and 108 were the lowest recorded (1982-1987). The low run in 1987 of the Tahltan stock group, 12,969 fish (82.6% age 1.3), was unexpected in light of the moderate, 28,257 fish, escapement in 1982. The low abundance of the age-1.2 fish, 14 out of the 797 (1.8%) ageable escapement scales, indicated a weak recruitment from the 1983 escapement (21,256 fish) as well. Although there are currently few data points, it appears that sibling forecasting may be an appropriate means of predicting future Tahltan runs. The low return of the non-Tahltan Stikine stock group, was also unexpected. However, the variances around the escapement estimates for this group are very large and a spawner-recruit curve is difficult to develop. The egg to juvenile survival of the sockeye salmon that hatch and rear in the mainstem and side channels of the Stikine River would most likely be more heavily influenced by environmental factors, particularly water level, than would lake residents. Thus, the number of recruits may not be closely correlated to the number of spawners. The Canadian commercial fishery, initiated in 1979, may also have had a negative impact on the run. However, since 1986, also a low run, was the

first run when all contributing parent years had been subjected to major harvests in the fishery, no real conclusion can be drawn.

Two-stock standards were used for the Tahltan/non-Tahltan Stikine stock separation in the inriver test fishery and commercial catches. The numbers of samples used in the standards for fish other than age-1.3 were small, and therefore, variances in final stock composition estimates were relatively large compared to those of the age-1.3 fish.

The in-season and postseason stock composition comparison is a measure of interannual variation in scale patterns since the standards used are from 2 different years. Much of the differences in the in-season and postseason analyses can be expained by slight differences in the growth of the fish that returned in each year. For example, the means of both the freshwater and first marine scale zones of Alaska I age-1.3 fish were smaller in 1987 than in 1986, while the mean freshwater zone of the Alaska II fish was larger in 1987 than 1986. Since the freshwater zone of the Alaska I fish tends to be larger than that of the Alaska II fish, the 1986 model tended to overestimate the contributions of the Alaska I group and underestimate those of the Alaska II group in the 1987 sockeye catch. Similar trends were observed for other age fish and other stock groups; however, the changes are usually small and balance each other such that the in-season analysis still adequately reflects the weekly stock compositions.

The test fishery in the Stikine River was used to estimated both the stock composition and the run timing of the inriver sockeye run. The test fishery was used rather than the commercial catch since it fished throughout each week (5 to 6 d as opposed to 1 to 2 d for the commercial fishery), it was located below the known major spawning areas (some of the commercial fishery extends upriver of spawning grounds), and it was run in a standardized manner. The stock composition was estimated for the combined drift and set net test catches in order to get sufficiently large sample sizes for weekly estimates and to minimize the potential bias of gear selectivity. The migratory timing was estimated from the drift gill net CPUE since drift net catches appear to be less affected than set net catches by changes in water level and since the daily CPUE from multiple drifts would less affected by a fouled net than would the CPUE from a single day long set.

Knowledge of the migratory timing of the stock groups in mixed stock fisheries is necessary if managers wish to allow differential harvest rates on the various stock groups. The migratory timing of a stock group through a commercial fishery district can be estimated from the weekly proportion of the total CPUE attributed to that stock group. Although the CPUE may be affected by several variables including gear competition and efficiency, weather conditions, rate of fish passage, fishing expertise, or availability of other species, in some situations it is the best or only method available for estimating migratory timing.

Analysis of scale patterns enable us to estimate the contributions of major stock groups to fisheries in Districts 106-41, 106-30, and 108 and in the Stikine River. The in-season stock identification program provided managers with timely estimates of relative stock strengths which were used in making fishery extension or closure decisions. In-season exchange of stock

composition estimates, catches and CPUE's, and escapement data, between the CDFO and the ADF&G allowed personnel to cooperate in managing the Stikine River sockeye salmon as mandated in the U.S./Canada Pacific Salmon Treaty. Research on stock separation techniques is an ongoing process. Cooperative research programs between the U.S. and Canada should enable us to further refine stock composition estimates in the future.

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TABLES AND FIGURES

Table 1. Log-likelihood (G) values for a comparison of estimates in Alaska's District 108 commercial and test drift gill net fisheries, 1985-1987.

Stat. Week [a]	Fishery	Proportion Stikine	Number of Fish [b] Stikine	Non-Stikine	Total	G
Week 25	1985 Test	0.802	54	13	67	
	1986 Com.	0.750	23	8	30	
	Total		76	21	97	0.324
Week 26	1985 Test	0.866	48	7	55	
	1986 Test	0.832	94	19	113	
	1986 Com.	0.786	11	3	14	
	Total		153	29	182	0.627
Week 27	1985 Test	0.968	56	2	58	
	1986 Test	0.819	107	24	130	
	Total		163	25	188	9.405
Week 28	1985 Test	0.996	67	1	68	
	1986 Test	0.798	101	26	126	
	Total		167	27	194	17.802
Week 29	1985 Test	0.922	65	5	70	
	1986 Test	0.810	170	40	210	
	1986 Com.	0.829	248	51	299	
	Total		483	96	579	5.664

Critical values: $\chi^2_{0.05,1} = 3.841$, $\chi^2_{0.05,2} = 5.991$

Ho: The interyear stock composition estimates are independent for a given week.

[a] Week 25 starting date, June 16, 15, 14 in 1985, 1986, 1987, respectively.

[b] Numbers are from unexpanded samples.

Table 2. Estimated contributions of sockeye salmon stock groups to Alaska's District 106 and 108 commercial drift gill net fisheries, 1987.

Dates	Group	Catch by District 106-30	106-41	108 [a]	Total	Percent
6/21-6/27	Ak. I	809	2,886		3,695	0.69
Week 26	Ak. II	312	619		931	0.17
	Nas/Ske	33	289		322	0.06
	Tahltan	135	51		186	0.03
	Stikine	14	0		14	0.00
	Sti. Comb.			160	160	0.03
	Unknown			29	29	0.01
	Total	1,303	3,845	189	5,337	
6/28-7/04	Ak. I	1,511	5,422		6,933	0.65
Week 27	Ak. II	1,046	996		2,042	0.19
	Nas/Ske	358	996		1,354	0.13
	Tahltan	4	100		104	0.01
	Stikine	0	0		0	0.00
	Sti. Comb.			219	219	0.02
	Unknown			26	26	0.00
	Total	2,919	7,514	245	10,678	
7/05-7/11	Ak. I	4,108	6,445		10,553	0.49
Week 28	Ak. II	637	2,951		3,588	0.17
	Nas/Ske	805	4,962		5,767	0.27
	Tahltan	6	774		780	0.04
	Stikine	14	43		57	0.00
	Sti. Comb.			684	684	0.03
	Unknown			75	75	0.00
	Total	5,570	15,175	759	21,504	
7/12-7/18	Ak. I	5,714	9,927	37	15,678	0.69
Week 29	Ak. II	1,120	2,089	14	3,223	0.14
	Nas/Ske	1,035	1,629	0	2,664	0.12
	Tahltan	76	116	126	318	0.01
	Stikine	580	0	122	702	0.03
	Unknown			124		
	Total	8,525	13,761	299	22,585	
7/19-7/25	Ak. I	5,007	7,208		12,215	0.50
Week 30	Ak. II	4,486	5,451		9,937	0.40
	Nas/Ske	1,147	1,043		2,190	0.09
	Tahltan	0	114		114	0.00
	Stikine	0	215		215	0.01
	Total	10,640	14,031		24,671	
7/26-8/01	Ak. I	3,007	4,418		7,425	0.32
Week 31	Ak. II	7,276	4,568		11,844	0.52
	Nas/Ske	2,483	1,246		3,729	0.16
	Tahltan	0	0		0	0.00
	Stikine	0	0		0	0.00
	Total	12,766	10,232		22,998	
8/02-8/08	Ak. I	3,074	3,306		6,380	0.28
Week 32	Ak. II	7,196	5,494		12,690	0.55
	Nas/Ske	1,683	2,275		3,958	0.17
	Tahltan	0	0		0	0.00
	Stikine	0	0		0	0.00
	Total	11,953	11,075		23,028	
8/09-9/19	Ak. I	1,858	1,804		3,662	0.51
Wks 33-38	Ak. II	1,150	998		2,148	0.30
	Nas/Ske	476	730		1,206	0.17
	Tahltan	0	0		0	0.00
	Stikine	102	0		102	0.01
	Unknown			4		
	Total	3,586	3,532	4	7,122	
	Ak. I	25,088	41,416	37	66,541	0.48
	Ak. II	23,223	23,166	14	46,403	0.34
Fishery	Nas/Ske	8,020	13,170	0	21,190	0.15
Total	Tahltan	221	1,155	126	1,502	0.01
	Stikine	710	258	122	1,090	0.01
	Sti. Comb.			1063	1,063	0.01
	Unknown			258	258	0.00
	Total	57,262	79,165	1,620	138,047	

[a] The catch in weeks 26-28 was estimated for total Stikine River (Tahltan and non-Tahltan Stikine), the unknown fish are of Alaska I, Alaska II, or of Nass/Skeena origin.

Table 3. Estimated contributions of Tahltan and non-Tahltan sockeye salmon stock groups to the Stikine River test fishery and to Canada's lower river commercial fishery, 1987.

		Commercial Catch		Test Fishery	
Dates	Group	Total	Percent	Total	Percent
6/28-7/04	Tahltan	133	74.3	52	86.7
Week 27	Non-Tahltan	46	25.7	8	13.3
	Total	179		60	
7/05-7/11	Tahltan	148	87.6	162	77.5
Week 28	Non-Tahltan	21	12.4	47	22.5
	Total	169		209	
7/12-7/18	Tahltan	615	66.4	166	57.6
Week 29	Non-Tahltan	311	33.6	122	42.4
	Total	926		288	
7/19-7/25	Tahltan	264	24.4	82	28.0
Week 30	Non-Tahltan	820	75.6	211	72.0
	Total	1,084		293	
7/26-8/01	Tahltan	50	11.3	25	8.8
Week 31	Non-Tahltan	391	88.7	258	91.2
	Total	441		283	
8/02-8/08	Tahltan	125	5.1	25	9.3
Week 32	Non-Tahltan	2,327	94.9	244	90.7
	Total	2,452		269	
8/09-8/15	Tahltan	22	4.0	1	0.6
Week 33	Non-Tahltan	527	96.0	162	99.4
	Total	549		163	
8/16-9/26	Tahltan	23	6.8	0	0.0
Wks 34-39	Non-Tahltan	315	93.2	102	100.0
	Total	338		102	
Fishery	Tahltan	1,380	22.5	513	30.8
Totals	Non-Tahltan	4,758	77.5	1,154	69.2
	Total	6,138		1,667	

Table 4. Mean classification accuracies from linear discriminant function models used to classify sockeye salmon harvested in Alaska's Districts 106 and 108 and Canada's Stikine River gill net fisheries, 1987.

	Mean Classification Accuracy by Age			
Stock Groups	1.2	1.3	2.2	2.3
Alaska I vs Alaska II vs Nass/Skeena vs Tahltan vs Stikine		0.670		
Alaska I vs Alaska II vs Nass/Skeena vs Tahltan		0.753		0.711
Alaska I vs Alaska II vs Nass/Skeena vs Stikine		0.707		
Alaska I vs Alaska II vs Tahltan vs Stikine		0.674		
Alaska I vs Alaska II vs Nass/Skeena	0.779	0.795		0.749
Alaska I vs Alaska II vs Tahltan		0.807		0.761
Alaska I vs Alaska II vs Stikine		0.761		
Alaska I vs Nass/Skeena vs Tahltan		0.726		
Alaska I vs Nass/Skeena vs Stikine		0.772		
Alaska I vs Tahltan vs Stikine		0.748		
Alaska I vs Alaska II	0.835			0.738
Alaska I vs Nass/Skeena	0.936		0.924	0.933
Alaska II vs Nass/Skeena				0.916
Tahltan vs Stikine	0.897	0.884	0.971	0.814

Table 5. Catch and escapement of Stikine River sockeye salmon, 1987.

Area	Combined[a]	Tahltan	non-Tahltan	Total
Canadian Catch				
Telegraph Creek Food Fishery		2,681	298	2,979
Upper River Commercial		448	50	498
Lower River Commercial		1,380	4,758	6,138
Total Canadian Catch		4,509	5,106	9,615
Alaskan Catch				
District 106 and 108	1,063	1,502	1,090	3,655
Total Catch	1,063	6,011	6,196	13,270
Spawning Escapement		6,958	17,055	24,013
Total Inriver Run		11,467	22,161	33,628
Total Stikine River Run		12,969	23,251	37,283
Test Fishery Catches[b]				
Canada's Inriver		513	1,154	1,667
Alaska's District 106[c]		42	0	42
Alaska's District 108[d]		48	201	249

[a] Combined Tahltan and non-Tahltan Sitkine from District 108.
[b] Test fishery catches not included in total run size estimation by agreement of Transboundary Technical Committee agreement.
[c] Not sampled, weekly stock composition estimates from the commercial catches applied to weekly test fishery catches.
[d] Not sampled, weekly stock composition estimates from test fisheries in previous years applied to 1987 catches.

Table 6. Log-likelihood (G) values for the comparison of weekly in-season and postseason stock composition estimates for sockeye salmon harvested in Alaska's District 106 and Canada's Stikine River commercial gill net fisheries, 1987.

Stat. Week	Dates	G	P	Reject Ho[a]
106-41 Critical value = 9.488				
26	6/21-6/27	19.989	P < 0.001	yes
27	6/28-7/04	2.595	0.500 < P < 0.750	no
28	7/05-7/11	8.698	0.050 < P < 0.100	no
29	7/12-7/18	3.590	0.250 < P < 0.500	no
30	7/19-7/25	4.959	0.250 < P < 0.500	no
31	7/26-8/01	14.267	0.010 < P < 0.005	yes
32	8/02-8/08	30.194	P < 0.001	yes
Season total		117.443	P < 0.001	yes
106-30 Critical value = 9.488				
26	6/21-6/27	8.438	0.050 < P < 0.100	no
27	6/28-7/04	17.424	0.005 < P < 0.010	yes
28	7/05-7/11	1.652	0.750 < P < 0.900	no
29	7/12-7/18	12.792	0.025 < P < 0.050	yes
30	7/19-7/25	93.983	P < 0.001	yes
31	7/26-8/01	33.225	P < 0.001	yes
32	8/02-8/08	20.958	P < 0.001	yes
Season total		159.939	P < 0.001	yes
Stikine Critical value = 3.841				
27	6/28-7/04	0.335	0.500 < P < 0.750	no
28	7/05-7/11	1.839	0.100 < P < 0.250	no
29	7/12-7/18	0.299	0.500 < P < 0.750	no
30	7/19-7/25	1.324	0.100 < P < 0.250	no
31	7/26-8/01	0.884	0.250 < P < 0.500	no
32	8/02-8/08	0.420	0.500 < P < 0.750	no
Season total		0.010	0.900 < P < 0.950	no

[a] Ho: The stock composition estimates are independent of the type of analysis (ie. in-season or postseason).

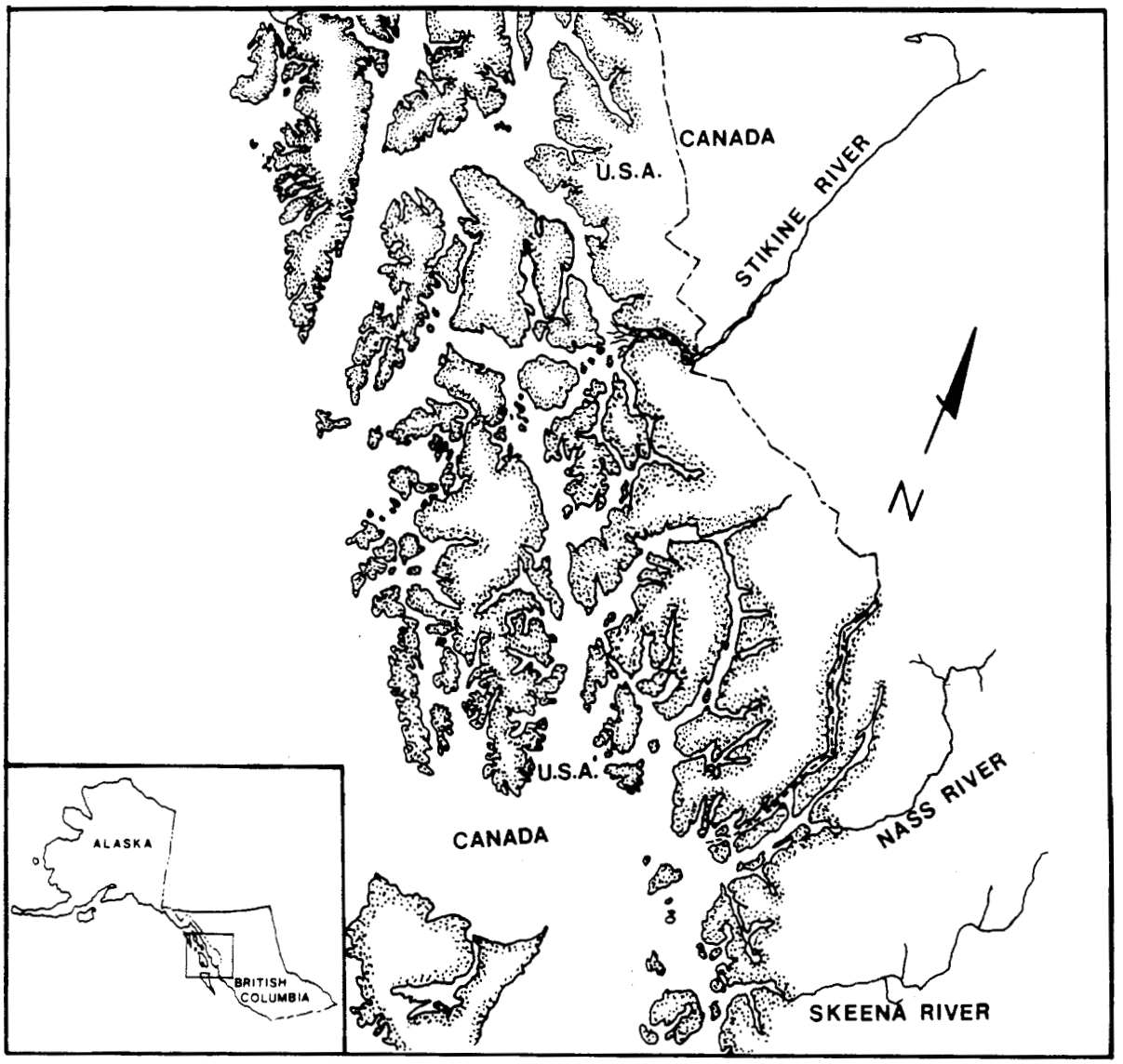

Figure 1. Southeast Alaska, northern British Columbia, and the transboundary Stikine River.

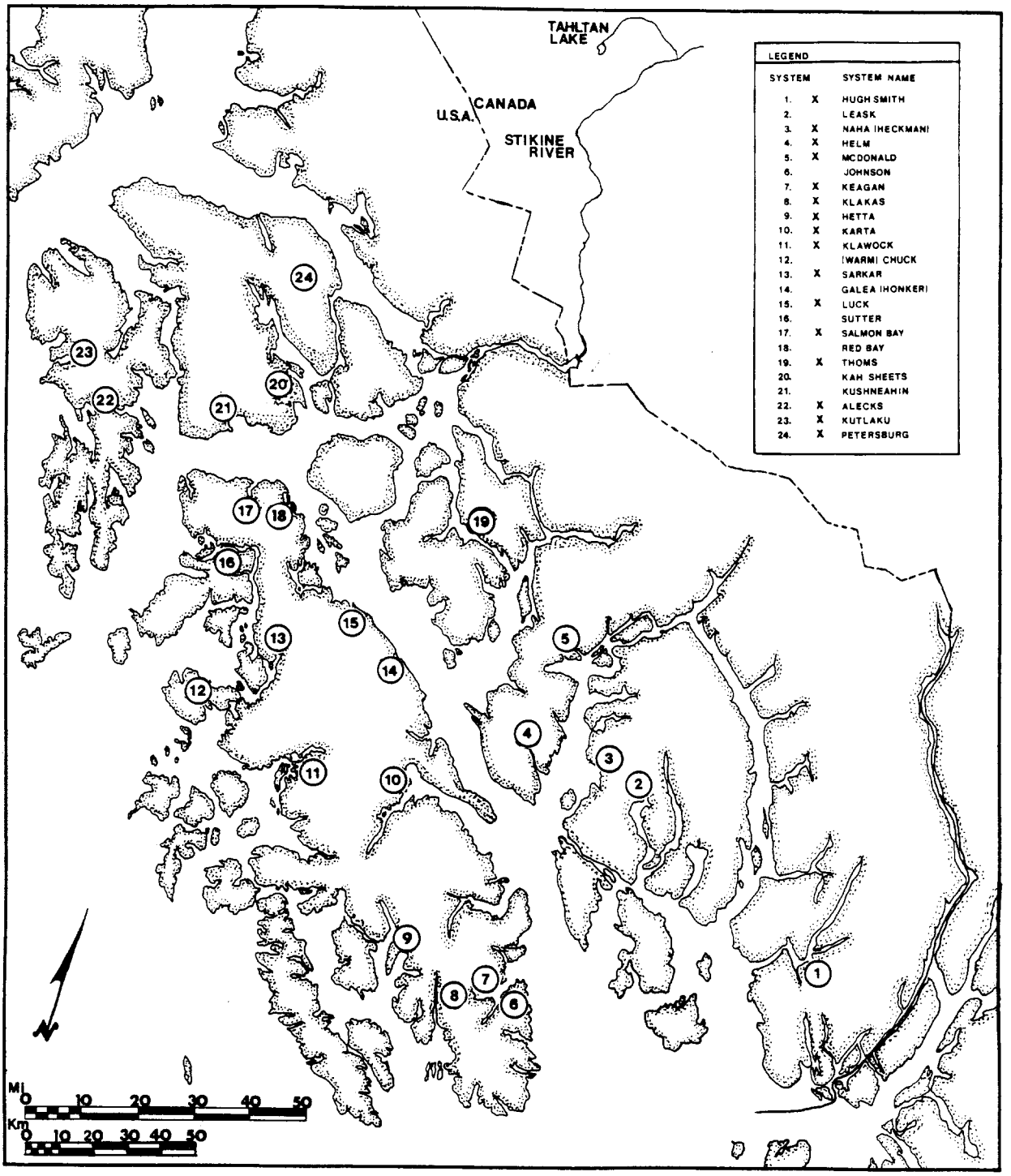

Figure 2. Major sockeye salmon systems of Southeast Alaska. Numbers identify lakes where scale samples have been collected and x indicates systems where scales were collected in 1987.

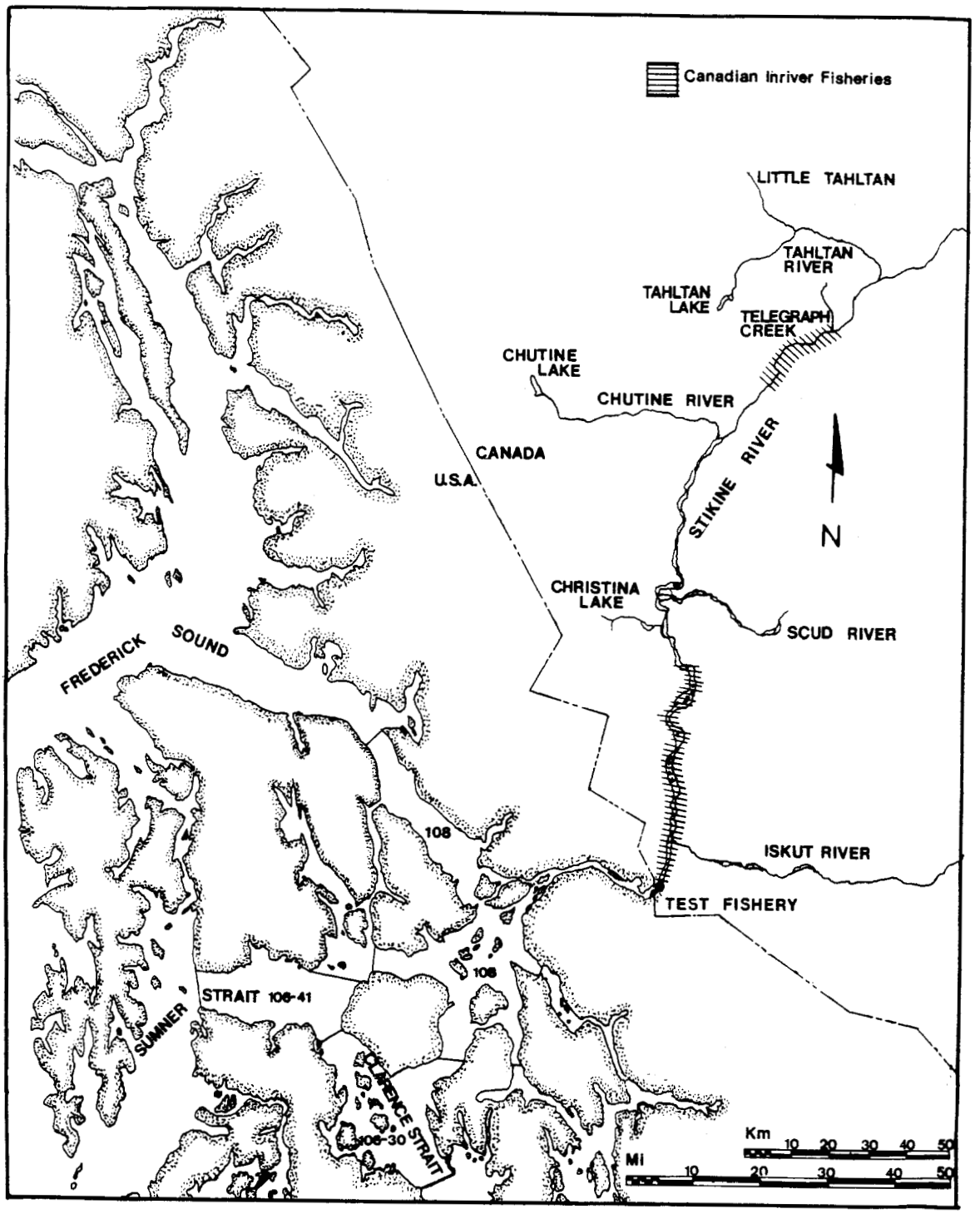

Figure 3. The transboundary Stikine River, major tributaries, and fishery areas.

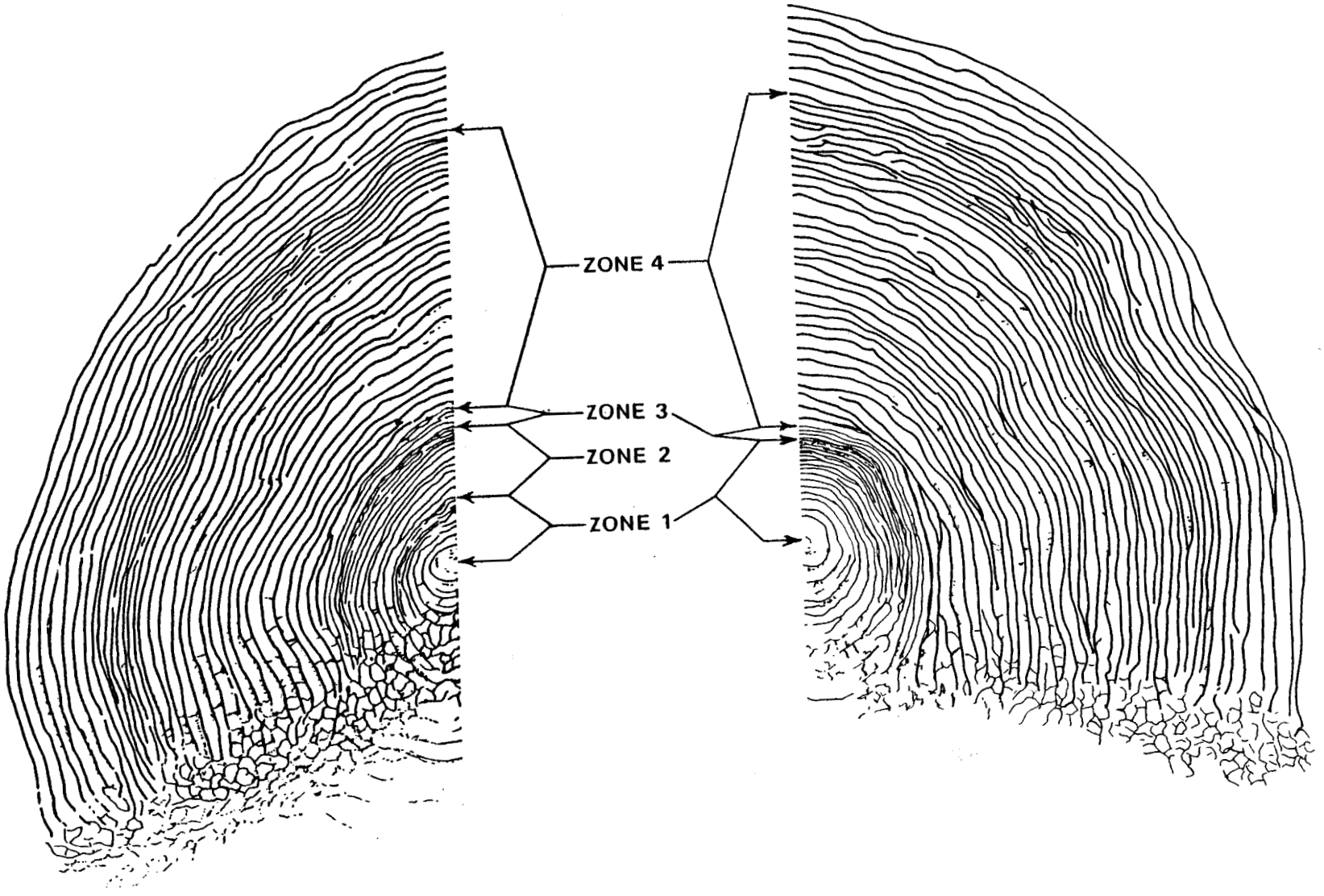

Figure 4. Typical scale for age-2. and -1. sockeye salmon with zones used for scale pattern analysis delineated.

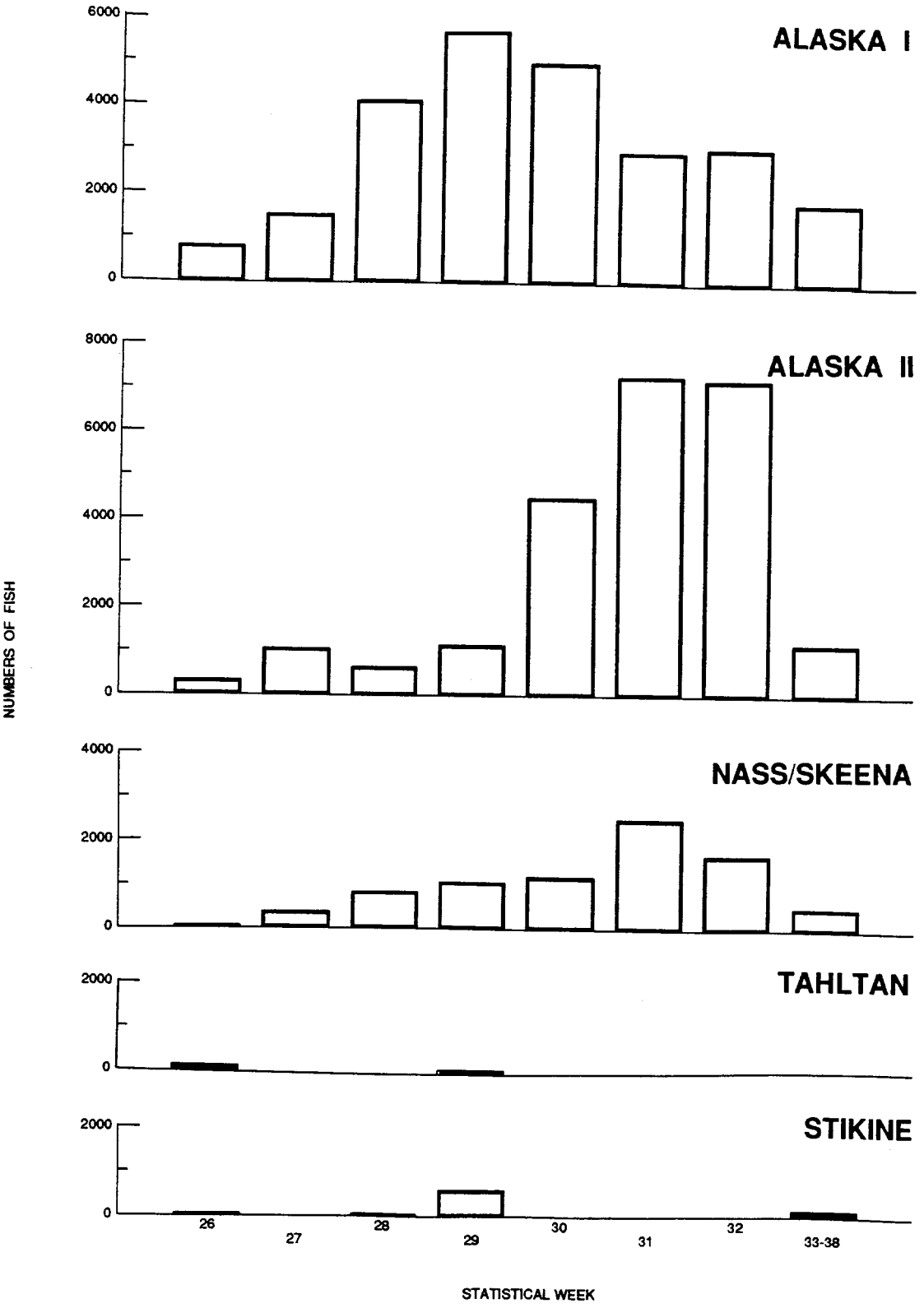

Figure 5. Weekly harvest of major sockeye salmon stock groups in Alaska's Subdistrict 106-30 drift gill net fishery, 1987.

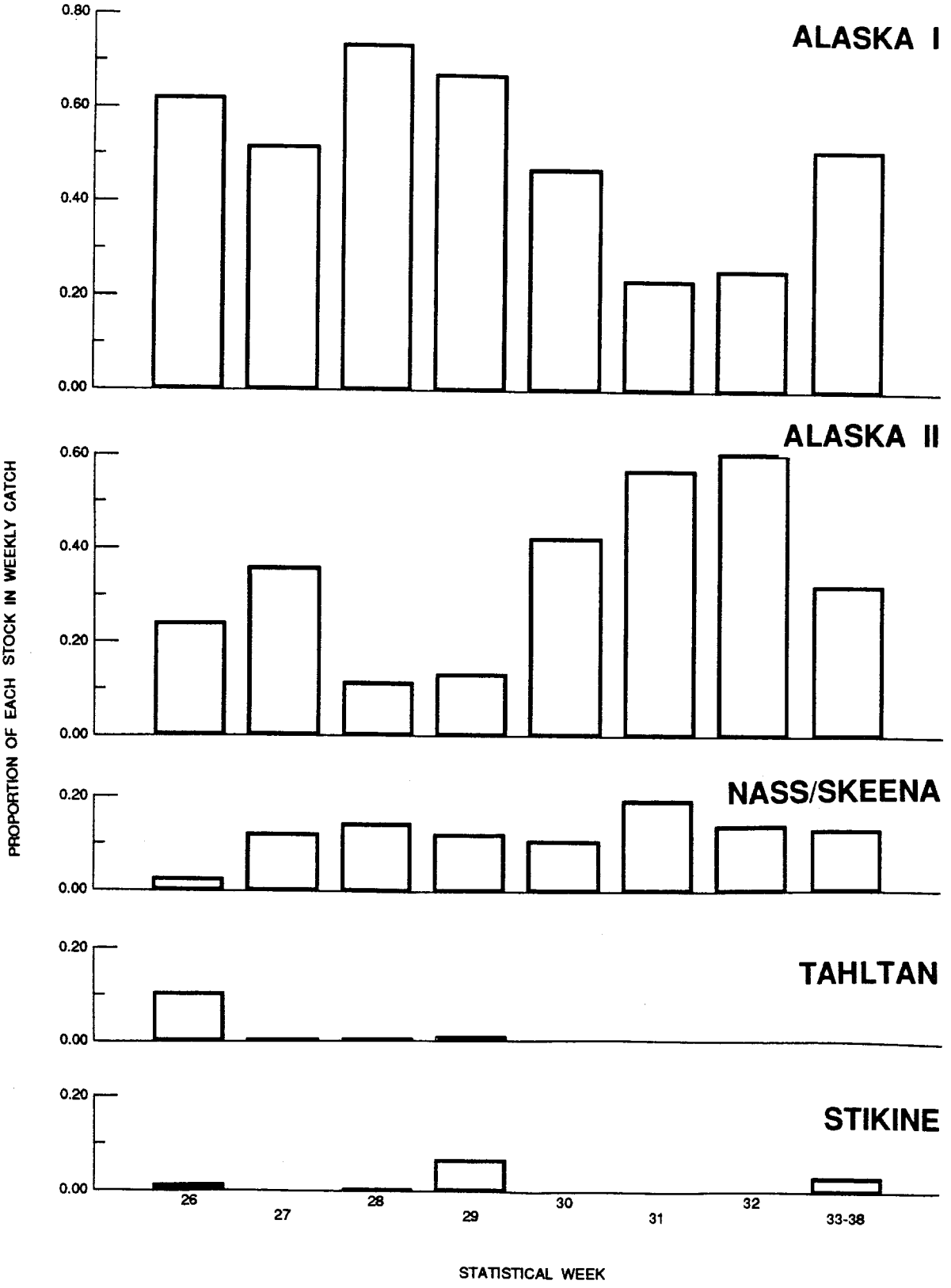

Figure 6. Proportion of each major sockeye salmon stock group in the weekly catch in Alaska's Subdistrict 106-30 drift gill net fishery, 1987.

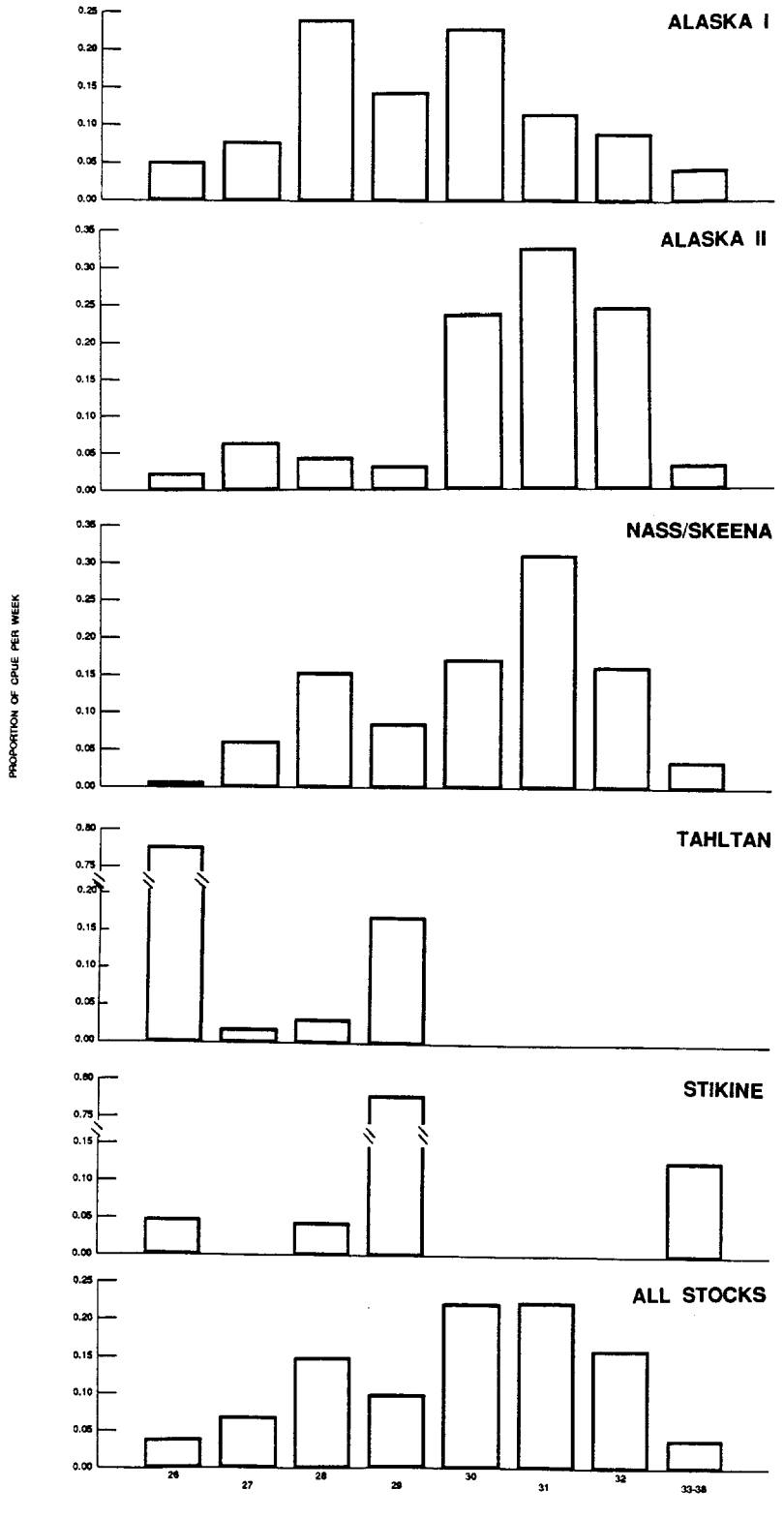

Figure 7. Migratory timing of major sockeye salmon stock groups as indicated by the weekly proportion of a total stock group CPUE in Alaska's Subdistrict 106-30 drift gill net fishery, 1987.

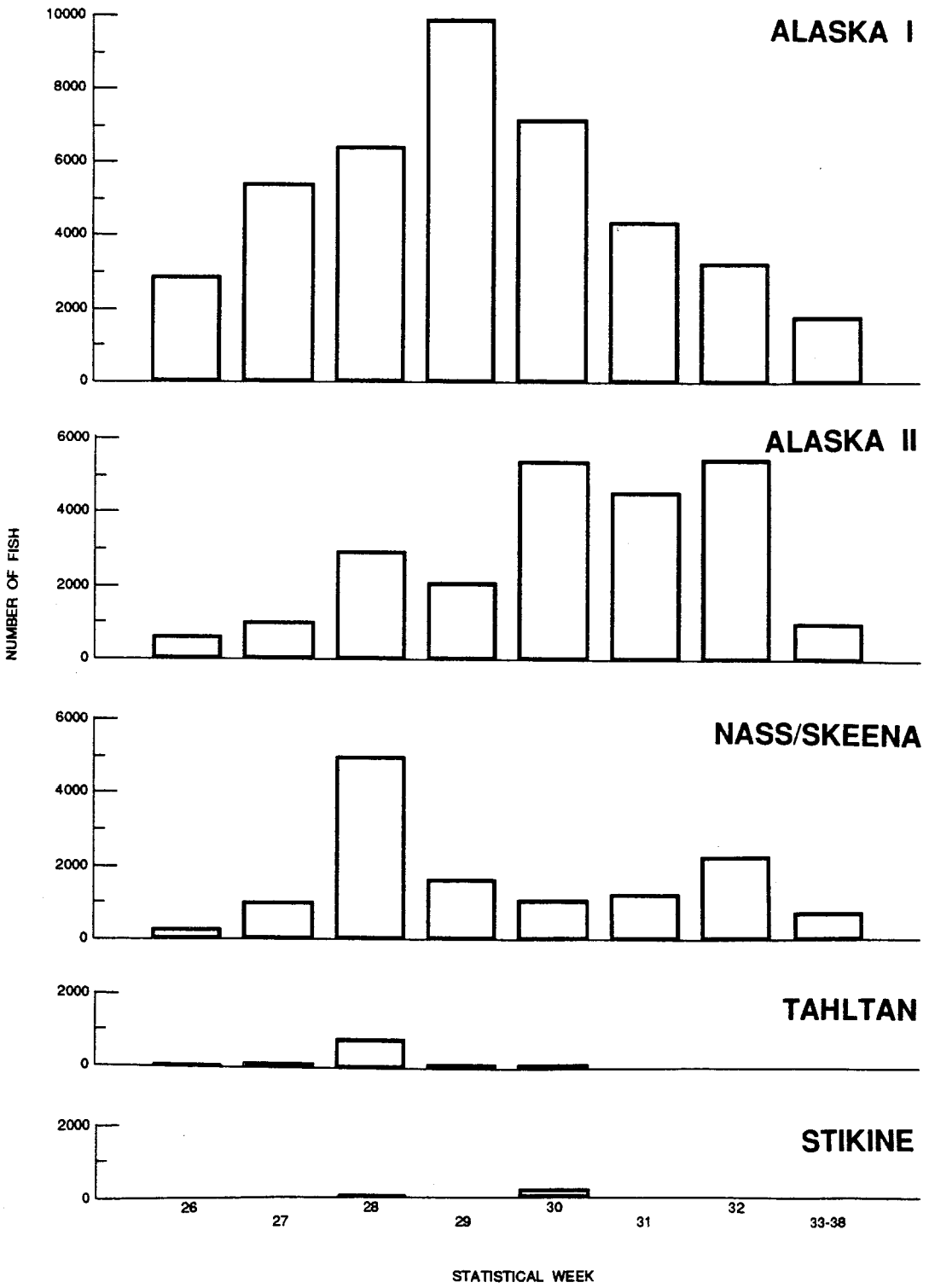

Figure 8. Weekly harvest of major sockeye salmon stock groups in Alaska's Subdistrict 106-41 drift gill net fishery, 1987.

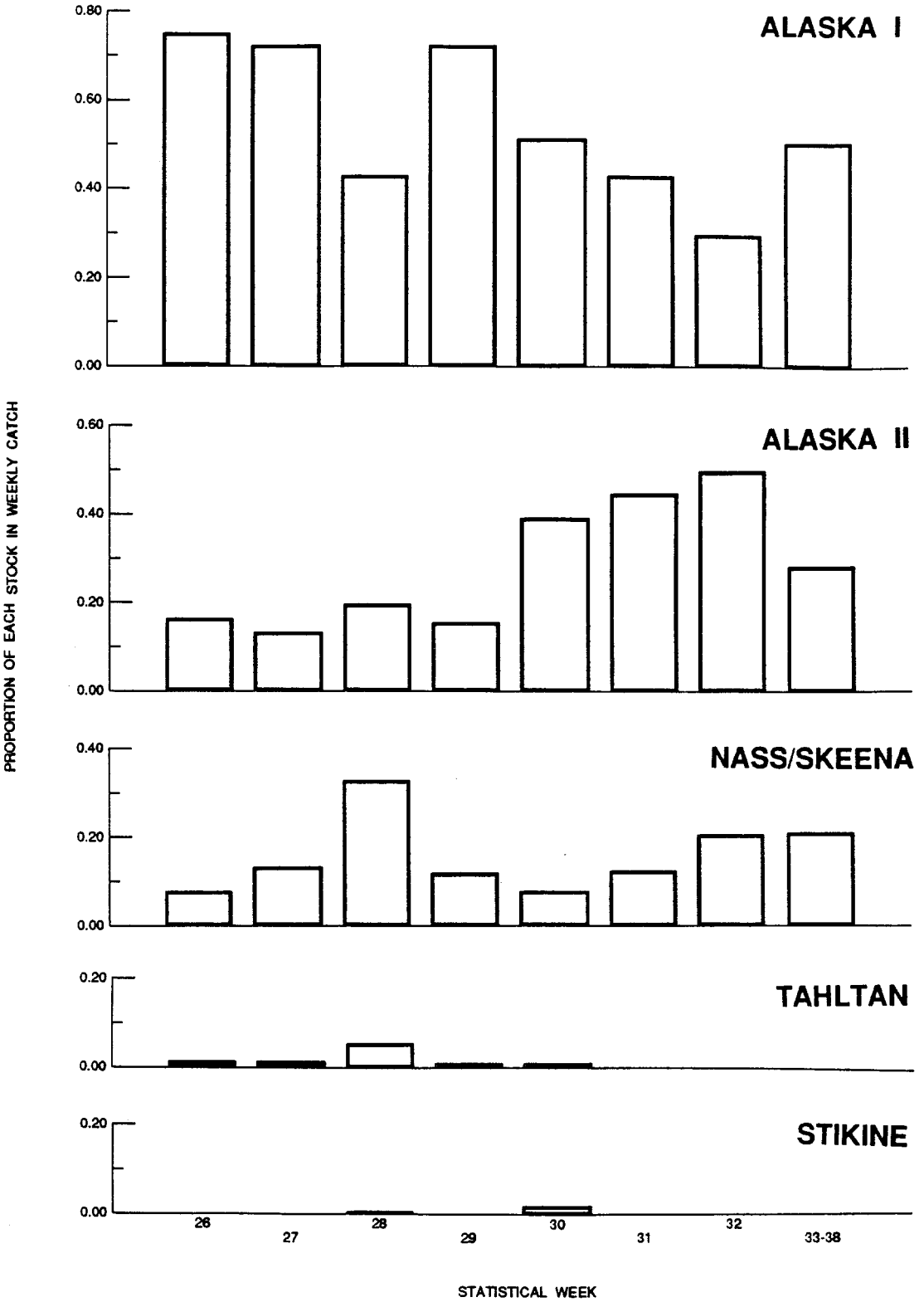

Figure 9. Proportion of each major sockeye salmon stock group in the weekly catch in Alaska's Subdistrict 106-41 drift gill net fishery, 1987.

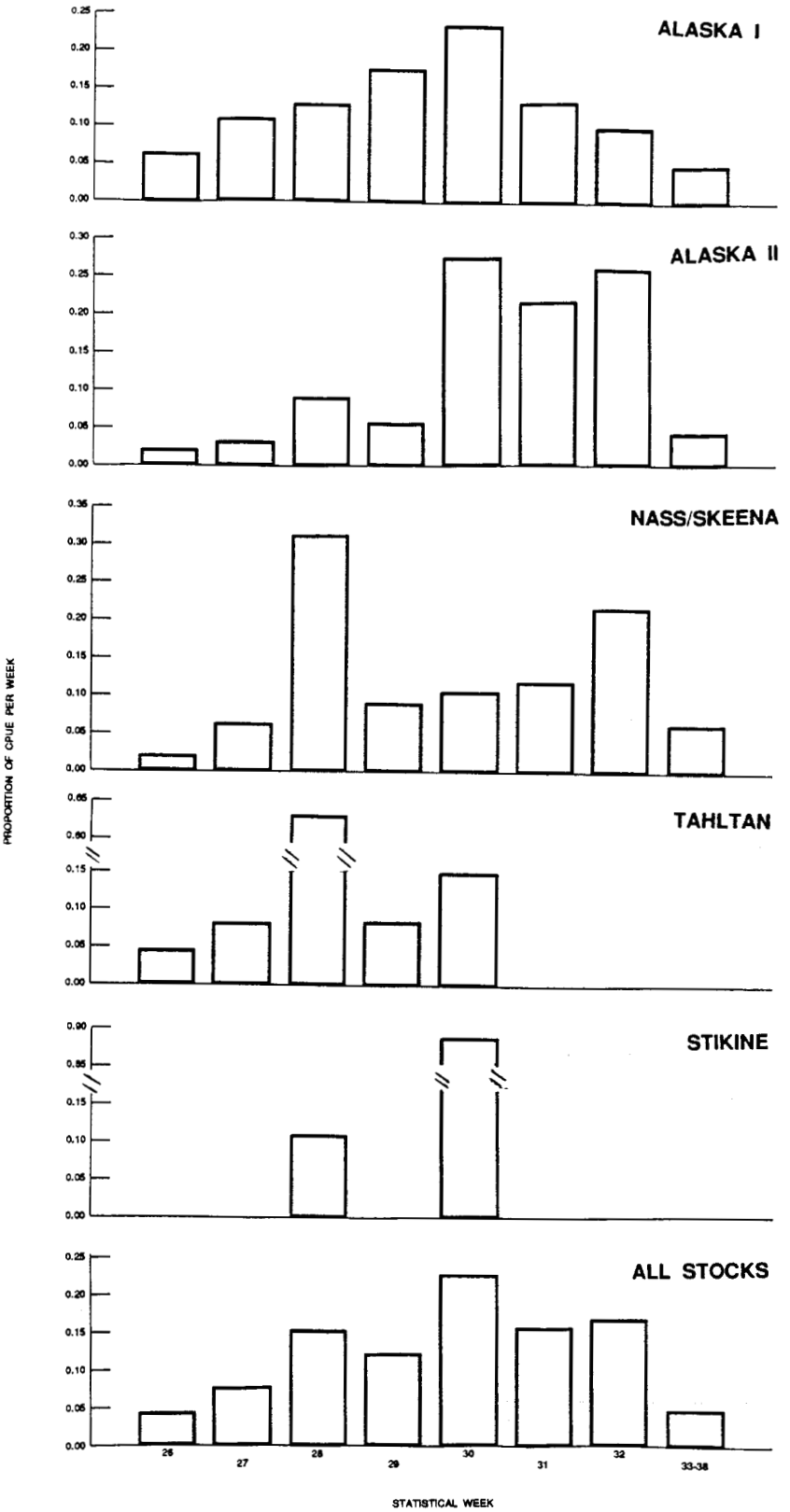

Figure 10. Migratory timing of major sockeye salmon stock groups as indicated by the weekly proportion of a total stock group CPUE in Alaska's Subdistrict 106-41 drift gill net fishery.

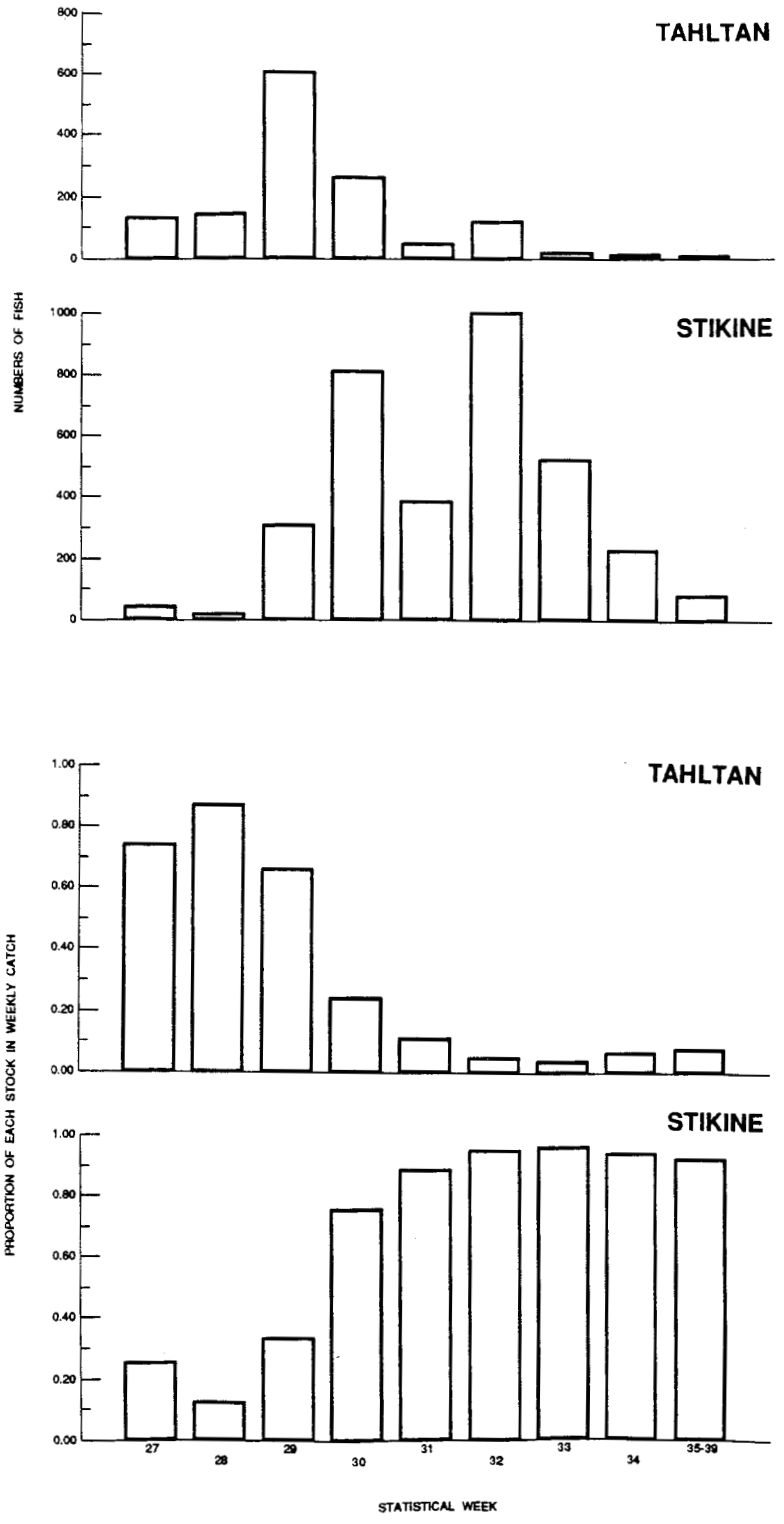

Figure 11. Weekly harvest of Tahltan and Stikine sockeye salmon and relative abundance of the two stock groups in Canada's lower Stikine River commercial fishery, 1987.

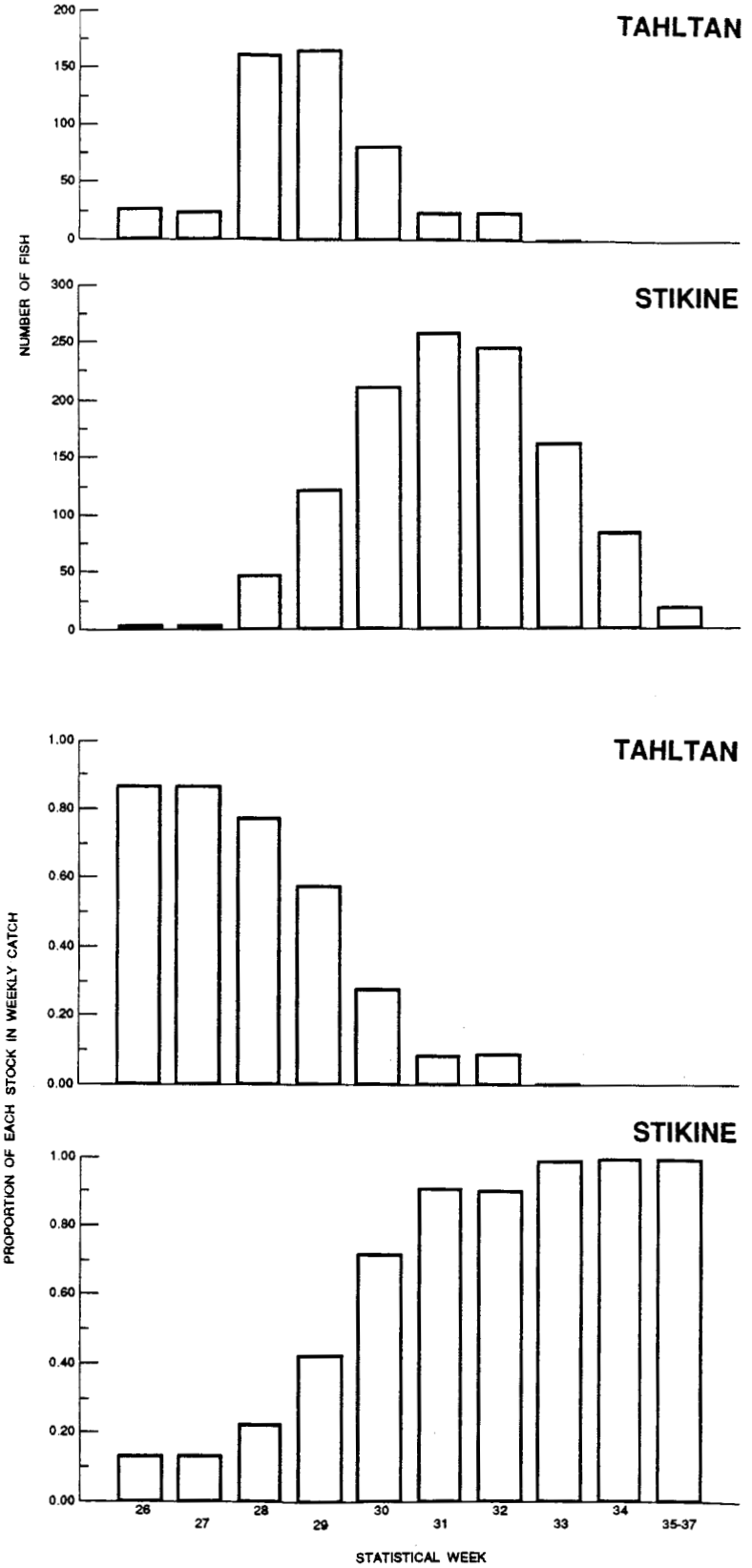

Figure 12. Weekly catch of Tahltan and Stikine sockeye salmon and relative abundance of the two stock groups in the Stikine River test fishery, 1987.

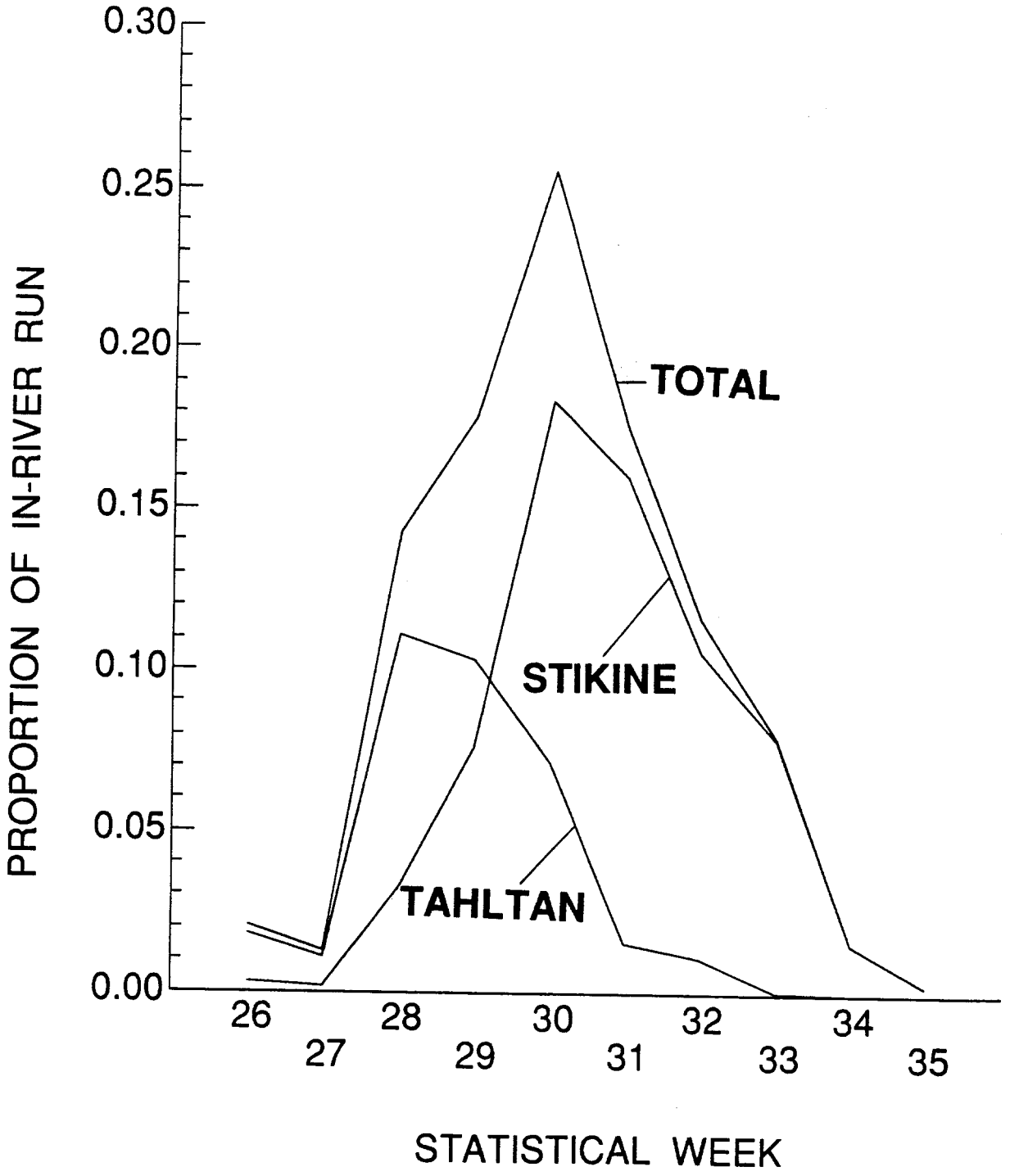

Figure 13. Migratory timing of the Tahltan and Stikine sockeye stock groups as indicated by the weekly proportion of total stock group CPUE in the Stikine River test fishery, 1987.

APPENDICES

Appendix A.1. Sample sizes from the in-season sockeye salmon stock composition estimates from Alaska's Districts 106 and 108 and Canada's Stikine River commercial gill net fisheries, 1987.

Stat. Week	Date	Sample Size by Age Group					
		1.2	1.3	2.2	2.3	0.	Total
106-30							
26	6/21-6/27	0	62	0	0	0	62
27	6/28-7/04	20	100	0	25	0	145
28	7/05-7/11	62	100	0	76	0	238
29	7/12-7/18	38	100	0	90	0	228
30	7/19-7/25	48	99	0	86	0	233
31	7/26-8/01	20	87	0	52	0	159
32	8/02-8/08	30	100	0	71	0	201
Totals		218	648	0	400	0	1266
106-41							
26	6/21-6/27	45	209	0	65	0	319
27	6/28-7/04	47	192	0	56	0	295
28	7/05-7/11	53	187	0	77	0	317
29	7/12-7/18	66	193	0	79	0	338
30	7/19-7/25	40	199	0	102	0	341
31	7/26-8/01	47	187	0	100	0	334
32	8/02-8/08	43	141	0	100	0	284
Totals		341	1308	0	579	0	2228
108							
29	7/12-7/18	0	57	0	0	10	67
Totals		0	57	0	0	10	67
Stikine, Canadian							
27	6/28-7/04	0	39	0	0	1	40
28	7/05-7/11	0	68	0	0	1	69
29	7/12-7/18	0	269	0	42	22	333
30	7/19-7/25	0	236	0	42	51	329
31	7/26-8/01	0	91	0	21	25	137
32	8/02-8/08	0	100	0	25	64	189
Totals		0	803	0	130	164	1097

Appendix A.2. Sample sizes from the postseason sockeye salmon stock composition estimates from Alaska's Districts 106 and 108 and Canada's Stikine River gill net fisheries, 1987.

Stat. Week	Date	Sample Size by Age Group [a] 1.2	1.3	2.2	2.3	0.	Total
106-30 Commercial							
26	6/21-6/27		62			0	62
27	6/28-7/04	26	100	37	40	0	203
28	7/05-7/11	62	100	52	76	0	290
29	7/12-7/18	47	100	37	100	0	284
30	7/19-7/25	55	99	36	98	0	288
31	7/26-8/01	41	87	38	100	0	266
32	8/02-8/08	49	100	52	71	0	272
33-38	8/09-9/19	71	100	79	100	0	350
Totals		351	748	331	585	0	2015
106-41 Commercial							
26	6/21-6/27	45	209	47	65	0	366
27	6/28-7/04	47	192	49	56	0	344
28	7/05-7/11	53	187	38	77	0	355
29	7/12-7/18	66	193	29	79	0	367
30	7/19-7/25	40	199	40	102	0	381
31	7/26-8/01	47	187	52	100	0	386
32	8/02-8/08	43	141	64	100	0	348
33-38	8/09-9/19	69	127	98	100	0	394
Totals		410	1435	417	679	0	2941
108 Commercial							
29	7/12-7/18	0	57	0	0	10	67
Totals		0	57	0	0	10	67
Stikine Commercial							
27	6/28-7/04		39			1	40
28	7/05-7/11	12	68		7	1	88
29	7/12-7/18	36	269	14	42	22	383
30	7/19-7/25	51	236	17	42	51	397
31	7/26-8/01	35	91		21	25	172
32	8/02-8/08	102	100	15	25	64	306
33	8/09-8/15	48	99	12	17	32	208
34	8/16-8/22	28	56			12	96
35-39	8/23-9/19		33			10	43
Totals		312	991	58	154	218	1733
Stikine Test							
26-27	6/21-7/04		47			3	50
28	7/05-7/11		146		22	5	173
29	7/12-7/18	17	147		32	19	215
30	7/19-7/25	20	160	14	21	33	248
31	7/26-8/01	23	139	9	20	35	226
32	8/02-8/08	27	119		14	26	186
33	8/09-8/15	25	87		16	15	143
34-37	8/16-9/12		45			11	56
Totals		112	890	23	125	147	1297

[a] The samples for some ages in some weeks were too small to analyze and were combined with adjacent weeks and weighted by relative catches.

Appendix A.3. Scale variables used for age-1.2, 1.3, 2.2, and 2.3 sockeye salmon scale pattern analysis.

Variable Number	Description
	First Freshwater (FW) Annular Zone
1	Number of circuli in the zone
2	Distance across the zone
3	Distance: scale focus (CO) to the second circulus in zone (C2)
4	Distance: C0 to C4
5	Distance: C0 to C6
6	Distance: C0 to C8
7	Distance: C2 to C4
8	Distance: C2 to C6
9	Distance: C2 to C8
10	Distance: C4 to C6
11	Distance: C4 to C8
12	Distance: fourth from the last circulus of zone to end of zone
13	Distance: second from the last circulus of zone to end of zone
14	Distance: C2 to end of zone
15	Distance: C4 to end of zone
16	Relative Distance: (Variable #3)/(Variable #2)
17	Relative Distance: (Variable #4)/(Variable #2)
18	Relative Distance: (Variable #5)/(Variable #2)
19	Relative Distance: (Variable #6)/(Variable #2)
20	Relative Distance: (Variable #7)/(Variable #2)
21	Relative Distance: (Variable #8)/(Variable #2)
22	Relative Distance: (Variable #9)/(Variable #2)
23	Relative Distance: (Variable #10)/(Variable #2)
24	Relative Distance: (Variable #11)/(Variable #2)
25	Relative Distance: (Variable #12)/(Variable #2)
26	Relative Distance: (Variable #13)/(Variable #2)
27	Average Distance between circuli: (Variable #2)/(Variable #1)
28	Number of circuli in the first 3/4 of the zone
29	Maximum distance between two adjacent circuli in the zone
30	Relative Distance: (Variable #29)/(Variable #2)
	Second Freshwater (FW) Annular Zone
31	Number of circuli in the zone
32	Distance across the zone
33	Distance: end first annular zone (E1FW) to second circulus in zone
34	Distance: E1FW to C4
35	Distance: E1FW to C6
36	Distance: E1FW to C8
37	Distance: C2 to C4
38	Distance: C2 to C6
39	Distance: C2 to C8

-Continued-

Variable Number	Description
40	Distance: C4 to C6
41	Distance: C4 to C8
42	Distance: fourth from the last circulus of zone to end of zone
43	Distance: second from the last circulus of zone to end of zone
44	Distance: C2 to end of zone
45	Distance: C4 to end of zone
46	Relative Distance: Variable #33/Variable #32
47	Relative Distance: Variable #34/Variable #32
48	Relative Distance: Variable #35/Variable #32
49	Relative Distance: Variable #36/Variable #32
50	Relative Distance: Variable #37/Variable #32
51	Relative Distance: Variable #38/Variable #32
52	Relative Distance: Variable #39/Variable #32
53	Relative Distance: Variable #40/Variable #32
54	Relative Distance: Variable #41/Variable #32
55	Relative Distance: Variable #42/Variable #32
56	Relative Distance: Variable #43/Variable #32
57	Average Distance between circuli: Variable 32/Variable 31
58	Number of circuli in first 3/4 of zone
59	Maximum distance between two adjacent circuli in the zone
60	Relative Distance: Variable 59/Variable 32
	Freshwater Plus Growth (PG)
61	Number of circuli in the zone
62	Distance across the zone
	Combined Freshwater Zones
63	Total number annular circuli, Variable 1 + Variable 31
64	Total distance across freshwater zones, Variable 2 + Variable 32
65	Total number of circuli in the combined zones, NC1FW+NC2FW+NCPG
66	Total distance across the combined zones, S1FW+S2FW+SPGZ
67	Relative Distance: (Variable #2)/(Variable #66)
	First Marine (C) Annular Zone
70	Number of circuli in the zone
71	Distance across the zone
72	Distance: end of FW (EFW) to the third circulus in zone (C3)
73	Distance: EFW to C6
74	Distance: EFW to C9
75	Distance: EFW to C12
76	Distance: EFW to C15

-Continued-

Variable Number	Description
77	Distance: C3 to C6
78	Distance: C3 to C9
79	Distance: C3 to C12
80	Distance: C3 to C15
81	Distance: C6 to C9
82	Distance: C6 to C12
83	Distance: C6 to C15
84	Distance: C9 to C15
85	Distance: sixth from the last circulus of zone to end of zone
86	Distance: third from the last circulus of zone to end of zone
87	Distance: C3 to end of zone
88	Distance: C9 to end of zone
89	Distance: C15 to end of zone
90	Relative Distance: (Variable #72)/(Variable #71)
91	Relative Distance: (Variable #73)/(Variable #71)
92	Relative Distance: (Variable #74)/(Variable #71)
93	Relative Distance: (Variable #75)/(Variable #71)
94	Relative Distance: (Variable #76)/(Variable #71)
95	Relative Distance: (Variable #77)/(Variable #71)
96	Relative Distance: (Variable #78)/(Variable #71)
97	Relative Distance: (Variable #79)/(Variable #71)
98	Relative Distance: (Variable #80)/(Variable #71)
99	Relative Distance: (Variable #81)/(Variable #71)
100	Relative Distance: (Variable #82)/(Variable #71)
101	Relative Distance: (Variable #83)/(Variable #71)
102	Relative Distance: (Variable #84)/(Variable #71)
103	Relative Distance: (Variable #85)/(Variable #71)
104	Relative Distance: (Variable #86)/(Variable #71)
105	Relative Distance: (Variable #87)/(Variable #71)
106	Number of circuli in the first 1/2 of the zone
107	Maximum distance between two adjacent circuli in the zone
108	Relative Distance: (Variable #107)/(Variable #71)

Appendix B.1. Classification matrices for linear discriminant function models used to classify age-1.2 sockeye salmon from Alaska's Districts 106 and 108 and from Canada's Stikine River gill net fisheries, 1987.

Actual Group of Origin	Sample size	Classified Group of Origin		
3 way model :		Ak. I	Ak. II	Nas/Ske
Ak. I	212	0.750	0.189	0.061
Ak. II	58	0.138	0.759	0.103
Nas/Ske	208	0.053	0.120	0.827
Mean Proportion Correctly Classified				0.779
2 way model :		Ak. I	Ak. II	
Ak. I	212	0.825	0.175	
Ak. II	58	0.155	0.845	
Mean Proportion Correctly Classified				0.835
2 way model :		Ak. I		Nas/Ske
Ak. I	212	0.915		0.085
Nas/Ske	208	0.043		0.957
Mean Proportion Correctly Classified				0.936
2 way model :		Tahltan		Stikine
Tahltan	13	1.000		0.000
Stikine	29	0.207		0.793
Mean Proportion Correctly Classified				0.897

Appendix B.2. Classification matrices for linear discriminant function models used to classify age-1.3 sockeye salmon from Alaska's District 106 and 108 and Canada's Stikine River gill net fisheries, 1987.

Actual Group of Origin	Sample Size	Classified Group of Origin				
5 way model :		Ak. I	Ak. II	Nas/Ske	Tahltan	Stikine
Ak. I	190	0.558	0.153	0.105	0.105	0.079
Ak. II	200	0.120	0.815	0.005	0.000	0.060
Nas/Ske	200	0.025	0.060	0.745	0.095	0.075
Tahltan	200	0.090	0.000	0.120	0.705	0.085
Stikine	102	0.059	0.157	0.167	0.088	0.529
Mean Proportion Correctly Classified						0.670
4 way model :		Ak. I	Ak. II	Nas/Ske	Tahltan	
Ak. I	190	0.611	0.158	0.116	0.116	
Ak. II	200	0.170	0.820	0.010	0.000	
Nas/Ske	200	0.025	0.075	0.795	0.105	
Tahltan	200	0.120	0.000	0.095	0.785	
Mean Proportion Correctly Classified						0.753
4 way model :		Ak. I	Ak. II	Nas/Ske		Stikine
Ak. I	190	0.600	0.200	0.111		0.089
Ak. II	200	0.105	0.840	0.005		0.050
Nas/Ske	200	0.040	0.045	0.800		0.005
Stikine	102	0.078	0.176	0.157		0.588
Mean Proportion Correctly Classified						0.707
4 way model :		Ak. I	Ak. II		Tahltan	Stikine
Ak. I	190	0.558	0.216		0.147	0.079
Ak. II	200	0.115	0.800		0.005	0.080
Tahltan	200	0.150	0.020		0.680	0.150
Stikine	102	0.039	0.167		0.137	0.657
Mean Proportion Correctly Classified						0.674
3 way model :		Ak. I	Ak. II	Nas/Ske		
Ak. I	190	0.684	0.184	0.132		
Ak. II	200	0.170	0.825	0.005		
Nas/Ske	200	0.060	0.065	0.875		
Mean Proportion Correctly Classified						0.795
3 way model :		Ak. I	Ak. II		Tahltan	
Ak. I	190	0.621	0.237		0.142	
Ak. II	200	0.085	0.910		0.005	
Tahltan	200	0.100	0.010		0.890	
Mean Proportion Correctly Classified						0.807

-Continued-

Appendix B.2 (p. 2 of 2)

Actual Group of Origin	Sample Size	Classified Group of Origin		
3 way model :		Ak. I	Ak. II	Stikine
Ak. I	190	0.689	0.211	0.100
Ak. II	200	0.105	0.820	0.075
Stikine	102	0.069	0.157	0.775
Mean Proportion Correctly Classified				0.761
3 way model :		Ak. I	Nas/Ske	Tahltan
Ak. I	190	0.779	0.100	0.121
Nas/Ske	200	0.080	0.685	0.235
Tahltan	200	0.085	0.200	0.715
Mean Proportion Correctly Classified				0.726
3 way model :		Ak. I	Nas/Ske	Stikine
Ak. I	190	0.784	0.089	0.126
Nas/Ske	200	0.065	0.825	0.110
Stikine	102	0.118	0.176	0.706
Mean Proportion Correctly Classified				0.772
3 way model :		Ak. I	Tahltan	Stikine
Ak. I	190	0.742	0.153	0.105
Tahltan	200	0.105	0.815	0.080
Stikine	102	0.137	0.176	0.686
Mean Proportion Correctly Classified				0.748
2 way model :			Tahltan	Stikine
Tahltan	200		0.895	0.105
Stikine	102		0.127	0.873
Mean Proportion Correctly Classified				0.884

Appendix B.3. Classification matrices for linear discriminant function models used to classify age-2.2 sockeye salmon from Alaska's District 106 and 108 and Canada's Stikine River gill net fisheries, 1987.

Actual Group of Origin	Sample Size	Classified Group of Origin	
2 way model :		Ak. I	Nas/Ske
Ak. I	135	0.919	0.081
Nas/Ske	182	0.071	0.929
Mean Proportion Correctly Classified			0.924

2 way model :		Tahltan	Stikine
Tahltan	17	0.941	0.059
Stikine	8	0.000	1.000
Mean Proportion Correctly Classified			0.971

Appendix B.4. Classification matrices for linear discriminant function models used to classify age-2.3 sockeye salmon from Alaska's District 106 and 108 and Canada's Stikine River gill net fisheries, 1987.

Actual Group of Origin	Sample Size	Classified Group of Origin				
4 way model :		Ak. I	Ak. II	Nas/Ske	Tahltan	
Ak. I	184	0.587	0.299	0.092	0.022	
Ak. II	173	0.243	0.734	0.012	0.012	
Nas/Ske	63	0.016	0.048	0.762	0.175	
Tahltan	100	0.070	0.000	0.170	0.760	
Mean Proportion Correctly Classified						0.711
3 way model :		Ak. I	Ak. II	Nas/Ske		
Ak. I	184	0.630	0.304	0.092		
Ak. II	173	0.277	0.711	0.012		
Nas/Ske	63	0.048	0.048	0.905		
Mean Proportion Correctly Classified						0.749
3 way model		Ak. I	Ak. II		Tahltan	
Ak. I	184	0.603	0.359		0.038	
Ak. II	173	0.243	0.740		0.017	
Tahltan	100	0.060	0.000		0.940	
Mean Proportion Correctly Classified						0.761
2 way model :		Ak. I	Ak. II			
Ak. I	184	0.701	0.299			
Ak. II	173	0.225	0.775			
Mean Proportion Correctly Classified						0.738
2 way model :		Ak. I		Nas/Ske		
Ak. I	184	0.929		0.071		
Nas/Ske	63	0.063		0.937		
Mean Proportion Correctly Classified						0.933
2 way model :			Ak. II	Nas/Ske		
Ak. II	173		0.960	0.040		
Nas/Ske	63		0.127	0.873		
Mean Proportion Correctly Classified						0.916
2 way model :					Tahltan	Sitkine
Tahltan	100				0.850	0.150
Stikine	9				0.222	0.778
Mean Proportion Correctly Classified						0.814

Appendix C.1. Estimated contributions of sockeye salmon stocks originating in Alaska and Canada to Alaska's Subdistrict 106-30 drift gill net fishery, 1987.

Dates	Group	Catch By Age Class					Total	Percent	Standard Error[a]	90% C.I.[a]	
		1.2	1.3	2.2	2.3	Other				Lower	Upper
6/21-6/27	Ak. I	83	568	81	77	0	809	62.1	153.54	556	1,062
Week 26	Ak. II	2	282	0	28	0	312	23.9	114.50	124	500
	Nas/Ske	6	0	27	0	0	33	2.5	16.10	7	59
	Tahltan	0	133	0	2	0	135	10.4	97.85	0	296
	Stikine	0	14	0	0	0	14	1.1	71.99	0	132
	Total	91	997	108	107	0	1,303				
6/28-7/04	Ak. I	177	965	183	168	18	1,511	51.8	231.88	1,130	1,892
Week 27	Ak. II	4	970	0	60	12	1,046	35.8	200.28	717	1,375
	Nas/Ske	14	279	62	0	3	358	12.3	119.67	161	555
	Tahltan	0	0	0	4	0	4	0.1	13.70	0	27
	Stikine	0	0	0	0	0	0	0.0			
	Total	195	2,214	245	232	33	2,919				
7/05-7/11	Ak. I	498	2,710	324	556	20	4,108	73.8	418.14	3,420	4,796
Week 28	Ak. II	0	395	0	239	3	637	11.4	298.93	145	1,129
	Nas/Ske	138	470	181	12	4	805	14.5	241.55	408	1,202
	Tahltan	0	0	0	6	0	6	0.1	24.63	0	47
	Stikine	0	14	0	0	0	14	0.3	235.56	0	401
	Total	636	3,589	505	813	27	5,570				
7/12-7/18	Ak. I	431	3,468	404	1,342	69	5,714	67.0	653.38	4,639	6,789
Week 29	Ak. II	6	1,100	0	0	14	1,120	13.1	428.12	416	1,824
	Nas/Ske	195	516	138	173	13	1,035	12.1	368.72	428	1,642
	Tahltan	0	75	0	0	1	76	0.9	307.85	0	582
	Stikine	0	573	0	0	7	580	6.8	442.59	0	1,308
	Total	632	5,732	542	1,515	104	8,525				
7/19-7/25	Ak. I	905	2,861	574	643	24	5,007	47.1	734.51	3,799	6,215
Week 30	Ak. II	0	3,379	0	1,085	22	4,486	42.2	640.08	3,433	5,539
	Nas/Ske	89	859	89	104	6	1,147	10.8	366.67	544	1,750
	Tahltan	0	0	0	0	0	0	0.0			
	Stikine	0	0	0	0	0	0	0.0			
	Total	994	7,099	663	1,832	52	10,640				
7/26-8/01	Ak. I	618	1,698	677	0	14	3,007	23.6	755.18	1,765	4,249
Week 31	Ak. II	115	4,544	0	2,583	34	7,276	57.0	712.27	6,104	8,448
	Nas/Ske	183	1,844	259	185	12	2,483	19.5	486.17	1,683	3,283
	Tahltan	0	0	0	0	0	0	0.0			
	Stikine	0	0	0	0	0	0	0.0			
	Total	916	8,086	936	2,768	60	12,766				
8/02-8/08	Ak. I	507	1,884	642	0	41	3,074	25.7	637.62	2,025	4,123
Week 32	Ak. II	223	3,995	0	2,881	97	7,196	60.2	587.83	6,229	8,163
	Nas/Ske	326	848	434	53	22	1,683	14.1	357.54	1,095	2,271
	Tahltan	0	0	0	0	0	0	0.0			
	Stikine	0	0	0	0	0	0	0.0			
	Total	1,056	6,727	1,076	2,934	160	11,953				
8/09-9/19	Ak. I	274	1,111	308	154	11	1,858	51.8	232.35	1,476	2,240
Wks 33-38	Ak. II	0	427	0	718	5	1,150	32.1	192.99	833	1,467
	Nas/Ske	162	81	202	29	2	476	13.3	107.76	299	653
	Tahltan	0	0	0	0	0	0	0.0			
	Stikine	0	102	0	0	0	102	2.8	117.67	0	296
	Total	436	1,721	510	901	18	3,586				
	Ak. I	3,493	15,265	3,193	2,940	197	25,088	43.8	1499.52	22,621	27,555
	Ak. II	350	15,092	0	7,594	187	23,223	40.6	1274.74	21,126	25,320
Fishery	Nas/Ske	1,113	4,897	1,392	556	62	8,020	14.0	847.93	6,625	9,415
Total	Tahltan	0	208	0	12	1	221	0.4	324.23	0	754
	Stikine	0	703	0	0	7	710	1.2	520.01	0	1,565
	Total	4,956	36,165	4,585	11,102	454	57,262				

[a] The standard errors are minimum estimates since no estimates of the variance for stocks contributing 0 fish during a given week or for the 'other' age class are available. The 90% confidence intervals are affected in like manner.

Appendix C.2. Estimated CPUE and migratory timing of sockeye salmon stocks in Alaska's Subdistrict 106-30 drift gill net fishery, 1987.

CPUE

Stat Week	Days Open	Average Number Boats	Catch per Boat Day					
			Ak. I	Ak. II	Nas-Ske	Tahltan	Stikine	Total
26	2	29	14	5	1	2	0	22
27	2	36	21	15	5	0	0	41
28	2	32	64	10	13	0	0	87
29	2	74	39	8	7	1	4	58
30	2	41	61	55	14	0	0	130
31	2	49	31	74	25	0	0	130
32	2	64	24	56	13	0	0	93
33-38	6	26	12	7	3	0	1	23
Total			265	230	81	3	5	584

Migratory Timing

Stat Week	Proportion of Catch per Boat Day					
	Ak. I	Ak. II	Nas-Ske	Tahltan	Stikine	Total
26	0.05	0.02	0.01	0.78	0.05	0.04
27	0.08	0.06	0.06	0.02	0.00	0.07
28	0.24	0.04	0.16	0.03	0.04	0.15
29	0.15	0.03	0.09	0.17	0.78	0.10
30	0.23	0.24	0.17	0.00	0.00	0.22
31	0.12	0.32	0.31	0.00	0.00	0.22
32	0.09	0.24	0.16	0.00	0.00	0.16
33-38	0.04	0.03	0.04	0.00	0.13	0.04
Total	1.00	1.00	1.00	1.00	1.00	1.00

Appendix C.3. Estimated contributions of sockeye salmon stocks originating in Alaska and Canada to Alaska's Subdistrict 106-41 drift gill net fishery, 1987.

Dates	Group	Catch By Age Class					Total	Percent	Standard Error [a]	90% C.I. [a]	
		1.2	1.3	2.2	2.3	Other				Lower	Upper
6/21-6/27	Ak. I	305	1,896	319	312	54	2,886	75.1	222.8	2,519	3,253
Week 26	Ak. II	1	587	0	19	12	619	16.1	175.4	331	907
	Nas/Ske	0	248	0	35	6	289	7.5	119.8	92	486
	Tahltan	0	0	0	50	1	51	1.3	26.7	7	95
	Stikine	0	0	0	0	0	0	0.0			
	Total	306	2,731	319	416	73	3,845				
6/28-7/04	Ak. I	613	3,630	579	521	79	5,422	72.2	438.4	4,701	6,143
Week 27	Ak. II	0	869	0	113	14	996	13.3	334.5	446	1,546
	Nas/Ske	16	806	98	62	14	996	13.3	260.1	568	1,424
	Tahltan	0	0	0	99	1	100	1.3	54.6	10	190
	Stikine	0	0	0	0	0	0	0.0			
	Total	629	5,305	677	795	108	7,514				
7/05-7/11	Ak. I	866	3,846	480	1,121	132	6,445	42.5	834.0	5,073	7,817
Week 28	Ak. II	0	2,665	0	225	61	2,951	19.4	610.5	1,947	3,955
	Nas/Ske	481	3,602	530	247	102	4,962	32.7	628.2	3,929	5,995
	Tahltan	0	379	0	379	16	774	5.1	447.1	39	1,509
	Stikine	0	42	0	0	1	43	0.3	506.7	0	876
	Total	1,347	10,534	1,010	1,972	312	15,175				
7/12-7/18	Ak. I	1,134	6,794	505	1,384	110	9,927	72.1	819.2	8,579	11,275
Week 29	Ak. II	221	1,632	0	213	23	2,089	15.2	642.4	1,032	3,146
	Nas/Ske	203	1,116	187	105	18	1,629	11.8	462.6	868	2,390
	Tahltan	0	0	0	115	1	116	0.8	85.4	0	256
	Stikine	0	0	0	0	0	0	0.0			
	Total	1,558	9,542	692	1,817	152	13,761				
7/19-7/25	Ak. I	837	4,339	844	1,120	68	7,208	51.4	865.8	5,784	8,632
Week 30	Ak. II	0	4,145	0	1,255	51	5,451	38.8	680.8	4,331	6,571
	Nas/Ske	68	860	105	0	10	1,043	7.4	398.5	387	1,699
	Tahltan	0	106	0	7	1	114	0.8	334.7	0	665
	Stikine	0	213	0	0	2	215	1.5	475.0	0	996
	Total	905	9,663	949	2,382	132	14,031				
7/26-8/01	Ak. I	561	2,378	459	971	49	4,418	43.2	532.9	3,541	5,295
Week 31	Ak. II	108	3,329	0	1,082	49	4,568	44.6	766.3	3,307	5,829
	Nas/Ske	104	720	409	0	13	1,246	12.2	253.8	828	1,664
	Tahltan	0	0	0	0	0	0	0.0			
	Stikine	0	0	0	0	0	0	0.0			
	Total	773	6,427	868	2,053	111	10,232				
8/02-8/08	Ak. I	583	2,176	490	0	57	3,306	29.9	513.0	2,462	4,150
Week 32	Ak. II	0	2,880	0	2,520	94	5,494	49.6	460.9	4,736	6,252
	Nas/Ske	253	1,232	694	57	39	2,275	20.5	328.9	1,734	2,816
	Tahltan	0	0	0	0	0	0	0.0			
	Stikine	0	0	0	0	0	0	0.0			
	Total	836	6,288	1,184	2,577	190	11,075				
9/09-9/19	Ak. I	297	1,227	241	0	39	1,804	51.1	160.3	1,540	2,068
Wks 33-38	Ak. II	0	155	0	821	22	998	28.3	124.2	794	1,202
	Nas/Ske	138	236	330	9	17	730	20.7	107.6	553	907
	Tahltan	0	0	0	0	0	0	0.0			
	Stikine	0	0	0	0	0	0	0.0			
	Total	435	1,618	571	830	78	3,532				
	Ak. I	5,196	26,286	3,917	5,429	588	41,416	52.3	1711.9	38,600	44,232
	Ak. II	330	16,262	0	6,248	326	23,166	29.3	1444.9	20,789	25,543
Fishery	Nas/Ske	1,263	8,820	2,353	515	219	13,170	16.6	1016.7	11,497	14,843
Total	Tahltan	0	485	0	650	20	1,155	1.5	568.2	220	2,090
	Stikine	0	255	0	0	3	258	0.3	694.5	0	1,400
	Total	6,789	52,108	6,270	12,842	1,156	79,165				

[a] The standard errors are minimum estimates since no estimates of the variance for stocks contributing 0 fish during a given week or for the 'other' age class are available. The 90% confidence intervals are affected in like manner.

Appendix C.4. Estimated CPUE and migratory timing of sockeye salmon stocks in Alaska's Subdistrict 106-41 drift gill net fishery, 1987.

CPUE

Stat Week	Days Open	Average Number Boats	Catch per Boat Day					
			Ak. I	Ak. II	Nas-Ske	Tahltan	Stikine	Total
26	2	66	22	5	2	0	0	29
27	2	72	38	7	7	1	0	52
28	2	73	44	20	34	5	0	104
29	2	82	61	13	10	1	0	84
30	2	45	80	61	12	1	2	156
31	2	48	46	48	13	0	0	107
32	2	48	34	57	24	0	0	115
33-38	5.5	19	17	9	7	0	0	33
Total			342	219	108	8	3	680

Migratory Timing

Stat Week	Proportion of Catch per Boat Day					
	Ak. I	Ak. II	Nas-Ske	Tahltan	Stikine	Total
26	0.06	0.02	0.02	0.05	0.00	0.04
27	0.11	0.03	0.06	0.08	0.00	0.08
28	0.13	0.09	0.31	0.63	0.11	0.15
29	0.18	0.06	0.09	0.08	0.00	0.12
30	0.23	0.28	0.11	0.15	0.89	0.23
31	0.13	0.22	0.12	0.00	0.00	0.16
32	0.10	0.26	0.22	0.00	0.00	0.17
33-38	0.05	0.04	0.06	0.00	0.00	0.05
Total	1.00	1.00	1.00	1.00	1.00	1.00

Appendix C.5. Estimated contributions of sockeye salmon stocks originating in Alaska and Canada to Alaska's District 108 drift gill net fishery, 1987. [a]

Dates	Group	Catch 1.2	1.3	2.2	2.3	0.	Other	Total	Percent
6/21-6/27									
Week 26	Total							189	
6/28-7/04									
Week 27	Total							245	
7/05-7/11									
Week 28	Total							759	
7/12-7/18	Ak. I		37			0		37	8.8
Week 29	Ak. II		14			0		14	3.3
	Nas/Ske		0			0		0	0.0
	Tahltan		126			0		126	30.5
	Stikine		112			10		122	27.0
	Total	62	289	21	41	10	0	423	
7/19-8/22	No fishery openings								
Wks 30-34									
8/23-8/29									
Week 35	Total							2	
8/30-9/05									
Week 36	Total							1	
9/06-9/12									
Week 37	Total							1	
	Ak. I		37				0	37	2.3
	Ak. II		14				0	14	0.9
	Nas/Ske		0				0	0	0.0
Fishery	Tahltan		126				0	126	7.8
Total	Stikine		112				0	112	6.9
	Total		289				0	289	17.9
	Unknown	62		21	41			124	7.7
	Unsampled							1197	74.4
	Grand Total							1610	

[a] Samples available from statistical week 29 only.

Appendix D.1. Estimated contributions of sockeye salmon stock groups to Alaska's District 106 drift gill net fisheries (1982-1987).[a]

Stat. Week	Group	Year and Date of Stat. Week 25 (June) 1982 13-19	1983 12-18	1984 17-23	1985 16-22	1986 15-21	1987 14-20
25[b]	Alaska	4,126	not	1,364	9,279	2,212	not
	Nas-Ske	2,897	open	201	1,477	351	open
	Tahltan[c]			112	1,444	0	
	Stikine	129		8	3	0	
	Total	7,152		1,685	12,203	2,563	
26	Alaska	18,625	3,155	2,671	6,909	3,064	4,626
	Nas-Ske	11,806	1,587	562	1,789	503	322
	Tahltan		507	280	1,365	62	186
	Stikine	6,540	104	180	170	0	14
	Total	36,971	5,353	3,693	10,233	3,629	5,148
27	Alaska	25,978	4,037	5,475	14,314	12,124	8,975
	Nas-Ske	13,240	1,647	1,078	6,003	3,050	1,354
	Tahltan		1,327	844	7,801	1,184	104
	Stikine	5,932	51	312	270	420	0
	Total	45,150	7,062	7,709	28,388	16,778	10,433
28	Alaska	15,318	4,389	6,884	17,689	not	14,141
	Nas-Ske	12,197	913	2,563	13,132	open	5,767
	Tahltan		736	1,134	6,288		780
	Stikine	9,900	44	50	492		57
	Total	37,415	6,082	10,631	37,601		20,745
29	Alaska	9,110	3,411	13,314	21,025	6,086	18,850
	Nas-Ske	4,108	250	3,135	15,424	424	2,664
	Tahltan		355	307	7,152	2	192
	Stikine	4,686	240	2,420	299	0	580
	Total	17,904	4,256	19,176	43,900	6,512	22,286
30	Alaska	15,781	9,251	15,035	21,491	10,708	22,152
	Nas-Ske	10,975	1,451	6,937	24,173	4,039	2,190
	Tahltan		1,626	0	0	0	114
	Stikine	7,990	65	416	1,305	64	215
	Total	34,746	12,393	22,388	46,969	14,811	24,671
31[d]	Alaska	5,249	4,599	8,388	19,507	12,959	19,269
	Nas-Ske	6,573	3,227	6,654	30,943	7,553	3,729
	Tahltan		136	0	0	712	0
	Stikine	2,458	0	401	0	16	0
	Total	14,280	7,962	15,443	50,450	21,240	22,998
32	Alaska		883	4,042	7,891	9,296	19,070
	Nas-Ske		357	1,631	5,602	7,612	3,958
	Tahltan		129	0	0	0	0
	Stikine		36	97	46	105	0
	Total		1,405	5,770	13,539	17,013	23,028
33	Alaska		1,561	1,812	5,287	5,397	5,810
	Nas-Ske		762	1,080	7,259	10,182	1,206
	Tahltan		133	0	0	121	0
	Stikine		74	120	182	0	102
	Total		2,530	3,012	12,728	15,700	7,118
34	Alaska		790	1,382	3,560	3,293	
	Nas-Ske		143	820	4,702	8,970	
	Tahltan		51	0	0	0	
	Stikine		2	80	196	1	
	Total		986	2,282	8,458	12,264	
35-40	Alaska		595				
	Nas-Ske		274				
	Tahltan		30				
	Stikine		16				
	Total		915				
	Alaska	94,187	32,671	60,367	126,952	65,139	112,893
	Nas-Ske	61,796	10,611	24,661	110,504	42,684	21,190
	Tahltan		5,030	2,677	24,050	2,081	1,376
	Stikine	37,635	632	4,084	2,963	606	968
	Total	193,618	48,944	91,789	264,469	110,510	136,427

[a] 106-30 was open but 106-41 was not during weeks 25-28 in 1984, week 26 in 1985, and week 29 in 1986.

[b] Ak. I and II standards (1986 and 1987) were combined to facilitate comparision with the historical analyses.

[c] Tahltan and Stikine (non-Tahltan) were not separated in the 1982 analysis.

[d] The last figures in each column include catch from that week through the end of the season.

Appendix D.2. Estimated contribution rates of sockeye salmon stock groups to Alaska's District 106 drift gill net fisheries (1982-1987).[a]

Stat. Week	Group	Year and Date of Stat. Week 25 (June) 1982 13-19	1983 12-18	1984 17-23	1985 16-22	1986 15-21	1987 14-20
25[b]	Alaska	0.577	not	0.809	0.760	0.863	not
	Nas-Ske	0.405	open	0.119	0.121	0.137	open
	Tahltan[c]			0.066	0.118	0.000	
	Stikine	0.018		0.005	0.000	0.000	
26	Alaska	0.504	0.589	0.723	0.675	0.844	0.899
	Nas-Ske	0.319	0.296	0.152	0.175	0.139	0.063
	Tahltan		0.095	0.076	0.133	0.017	0.036
	Stikine	0.177	0.019	0.049	0.017	0.000	0.003
27	Alaska	0.575	0.572	0.710	0.504	0.723	0.860
	Nas-Ske	0.293	0.233	0.140	0.211	0.182	0.130
	Tahltan		0.188	0.109	0.275	0.071	0.010
	Stikine	0.131	0.007	0.040	0.010	0.025	0.000
28	Alaska	0.409	0.722	0.648	0.470	not	0.682
	Nas-Ske	0.326	0.150	0.241	0.349	open	0.278
	Tahltan		0.121	0.107	0.167		0.038
	Stikine	0.265	0.007	0.005	0.013		0.003
29	Alaska	0.509	0.801	0.694	0.479	0.935	0.846
	Nas-Ske	0.229	0.059	0.163	0.351	0.065	0.120
	Tahltan		0.083	0.016	0.163	0.000	0.009
	Stikine	0.262	0.056	0.126	0.007	0.000	0.026
30	Alaska	0.454	0.746	0.672	0.458	0.723	0.898
	Nas-Ske	0.316	0.117	0.310	0.515	0.273	0.089
	Tahltan		0.131	0.000	0.000	0.000	0.005
	Stikine	0.230	0.005	0.019	0.028	0.004	0.009
31[d]	Alaska	0.368	0.578	0.543	0.387	0.610	0.838
	Nas-Ske	0.460	0.405	0.431	0.613	0.356	0.162
	Tahltan	0.000	0.017	0.000	0.000	0.034	0.000
	Stikine	0.172	0.000	0.026	0.000	0.001	0.000
32	Alaska		0.628	0.701	0.583	0.546	0.828
	Nas-Ske		0.254	0.283	0.414	0.447	0.172
	Tahltan		0.092	0.000	0.000	0.000	0.000
	Stikine		0.026	0.017	0.003	0.006	0.000
33	Alaska		0.617	0.602	0.415	0.344	0.816
	Nas-Ske		0.301	0.359	0.570	0.649	0.169
	Tahltan		0.053	0.000	0.000	0.008	0.000
	Stikine		0.029	0.040	0.014	0.000	0.014
34	Alaska		0.801	0.606	0.421	0.269	
	Nas-Ske		0.145	0.359	0.556	0.731	
	Tahltan		0.052	0.000	0.000	0.000	
	Stikine		0.002	0.035	0.023	0.000	
35-40	Alaska		0.650				
	Nas-Ske		0.299				
	Tahltan		0.033				
	Stikine		0.017				
	Alaska	0.486	0.668	0.658	0.480	0.589	0.827
	Nas-Ske	0.319	0.217	0.269	0.418	0.386	0.155
	Tahltan	0.000	0.103	0.029	0.091	0.019	0.010
	Stikine	0.194	0.013	0.044	0.011	0.005	0.007

[a] 106-30 was open but 106-41 was not during weeks 25-28 in 1984, week 26 in 1985, and week 29 in 1986.

[b] Ak. I and II standards (1986 and 1987) were combined to facilitate comparison with the historical analyses.

[c] Tahltan and Stikine (non-Tahltan) were not separated in the 1982 analysis.

[d] The last figures in each column include catch from that week through the end of the season.

Appendix D.3. Estimated contributions of sockeye salmon stock groups to Alaska's Subdistricts 106-30 and 106-41 drift gill net fisheries (1985-1987).

Stat. Week	Group	106-30 Year and Date 1985 16-22	1986 15-21	1987 14-20	106-41 Year and Date 1985 16-22	1986 15-21	1987 14-20
25 [a]	Ak. I	1,821	553	not	7,458	1,659	not
	Ak. II		27	open		0	open
	Nas-Ske	285	64		1,192	287	
	Tahltan	451	0		993	0	
	Stikine	3	0		0	0	
	Total	2,560	644		9,643	1,946	
26	Ak. I	6,909	537	809	not	2,527	2,886
	Ak. II		46	312	open	14	619
	Nas-Ske	1,789	59	33		444	289
	Tahltan	1,365	0	135		62	51
	Stikine	170	0	14		0	0
	Total	10,233	642	1,303		3,047	3,845
27	Ak. I	4,879	3,539	1,511	9,435	8,585	5,422
	Ak. II		74	1,046		536	996
	Nas-Ske	2,099	673	358	3,904	2,377	996
	Tahltan	558	9	4	7,243	1,175	100
	Stikine	0	0	0	270	420	0
	Total	7,536	4,295	2,919	20,852	13,093	7,514
28	Ak. I	5,985	not	4,108	11,704	not	6,445
	Ak. II		open	637		open	2,951
	Nas-Ske	5,165		805	7,967		4,962
	Tahltan	19		6	6,269		774
	Stikine	361		14	131		43
	Total	11,530		5,570	26,071		15,175
29	Ak. I	3,642	6,086	5,714	17,383	not	9,927
	Ak. II		1,115	1,120		open	2,089
	Nas-Ske	4,067	424	1,035	11,357		1,629
	Tahltan	2,856	2	76	4,296		116
	Stikine	17	0	580	282		0
	Total	10,582	7,627	8,525	33,318		13,761
30	Ak. I	7,544	5,400	5,007	13,947	5,308	7,208
	Ak. II		2,092	4,486		4,553	5,451
	Nas-Ske	11,215	1,295	1,147	12,958	2,744	1,043
	Tahltan	0	0	0	0	0	114
	Stikine	502	0	0	803	64	215
	Total	19,261	8,787	10,640	27,708	12,669	14,031
31	Ak. I	6,349	5,590	3,007	13,158	7,369	4,418
	Ak. II		5,756	7,276		6,589	4,568
	Nas-Ske	10,626	2,993	2,483	20,317	4,560	1,246
	Tahltan	0	0	0	0	712	0
	Stikine	0	0	0	0	16	0
	Total	16,975	14,339	12,766	33,475	19,246	10,232
32	Ak. I	2,730	3,659	3,074	5,161	5,637	3,306
	Ak. II		3,350	7,196		4,456	5,494
	Nas-Ske	1,109	2,931	1,683	4,493	4,681	2,275
	Tahltan	0	0	0	0	0	0
	Stikine	46	105	0	0	0	0
	Total	3,885	10,045	11,953	9,654	14,774	11,075
33 [b]	Ak. I	2,640	2,042	1,858	2,647	3,355	1,804
	Ak. II		1,058	1,150		3,104	998
	Nas-Ske	2,582	2,696	476	4,677	7,486	730
	Tahltan	0	0	0	0	121	0
	Stikine	72	0	102	110	0	0
	Total	5,294	5,796	3,586	7,434	14,066	3,532
34	Ak. I	1,890	1,732		1,207	1,095	
	Ak. II		1,219			926	
	Nas-Ske	3,152	5,336		1,550	2,906	
	Tahltan	0	0		0	0	
	Stikine	81	0		115	0	
	Total	5,123	8,287		2,872	4,927	
35-40	Ak. I				463	466	
	Ak. II					280	
	Nas-Ske				547	728	
	Tahltan				0	0	
	Stikine				51	1	
	Total				1,061	1,475	
Totals	Ak. I	44,389	29,138	25,088	82,563	36,001	41,416
	Ak. II		14,737	23,223		20,458	23,166
	Nas-Ske	42,089	16,471	8,020	68,962	26,213	13,170
	Tahltan	5,249	11	221	18,801	2,070	1,155
	Stikine	1,252	105	710	1,762	501	258
	Total	92,979	60,462	57,262	172,088	85,243	79,165

[a] Ak. I and Ak. II stocks were not analyzed separately in 1985.
[b] The last figures in each column include catch from that week through the end of the season.

Appendix D.4. Estimated contribution rates of sockeye salmon stock groups to Alaska's Subdistricts 106-30 and 106-41 drift gill net fisheries (1985-1987).

Stat. Week	Group	106-30 Year and Date 1985 16-22	1986 15-21	1987 14-20	106-41 Year and Date 1985 16-22	1986 15-21	1987 14-20
25 [a]	Ak. I	0.711	0.859	not	0.773	0.853	not
	Ak. II		0.042	open		0.000	open
	Nas-Ske	0.111	0.099		0.124	0.147	
	Tahltan	0.176	0.000		0.103	0.000	
	Stikine	0.001	0.000		0.000	0.000	
26	Ak. I	0.675	0.836	0.621	not	0.829	0.751
	Ak. II		0.072	0.239		0.005	0.161
	Nas-Ske	0.175	0.092	0.025	open	0.146	0.075
	Tahltan	0.133	0.000	0.104		0.020	0.013
	Stikine	0.017	0.000	0.011		0.000	0.000
27	Ak. I	0.647	0.824	0.518	0.452	0.656	0.722
	Ak. II		0.017	0.358		0.041	0.133
	Nas-Ske	0.279	0.157	0.123	0.187	0.182	0.133
	Tahltan	0.074	0.002	0.001	0.347	0.090	0.013
	Stikine	0.000	0.000	0.000	0.013	0.032	0.000
28	Ak. I	0.519	not	0.738	0.449	not	0.425
	Ak. II		open	0.114		open	0.194
	Nas-Ske	0.448		0.145	0.306		0.327
	Tahltan	0.002		0.001	0.240		0.051
	Stikine	0.031		0.003	0.005		0.003
29	Ak. I	0.344	0.798	0.670	0.522	not	0.721
	Ak. II		0.146	0.131		open	0.152
	Nas-Ske	0.384	0.056	0.121	0.341		0.118
	Tahltan	0.270	0.000	0.009	0.129		0.008
	Stikine	0.002	0.000	0.068	0.008		0.000
30	Ak. I	0.392	0.615	0.471	0.503	0.419	0.514
	Ak. II		0.238	0.422		0.359	0.388
	Nas-Ske	0.582	0.147	0.108	0.468	0.217	0.074
	Tahltan	0.000	0.000	0.000	0.000	0.000	0.008
	Stikine	0.026	0.000	0.000	0.029	0.005	0.015
31	Ak. I	0.374	0.390	0.236	0.393	0.383	0.432
	Ak. II		0.401	0.570		0.342	0.446
	Nas-Ske	0.626	0.209	0.195	0.607	0.237	0.122
	Tahltan	0.000	0.000	0.000	0.000	0.037	0.000
	Stikine	0.000	0.000	0.000	0.000	0.001	0.000
32	Ak. I	0.703	0.364	0.257	0.535	0.382	0.299
	Ak. II		0.333	0.602		0.302	0.496
	Nas-Ske	0.285	0.292	0.141	0.465	0.317	0.205
	Tahltan	0.000	0.000	0.000	0.000	0.000	0.000
	Stikine	0.012	0.010	0.000	0.000	0.000	0.000
33	Ak. I	0.499	0.352	0.518	0.356	0.239	0.511
	Ak. II		0.183	0.321		0.221	0.283
	Nas-Ske	0.488	0.465	0.133	0.629	0.532	0.207
	Tahltan	0.000	0.000	0.000	0.000	0.009	0.000
	Stikine	0.014	0.000	0.028	0.015	0.000	0.000
34 [b]	Ak. I	0.369	0.209		0.420	0.222	
	Ak. II		0.147			0.188	
	Nas-Ske	0.615	0.644		0.540	0.590	
	Tahltan	0.000	0.000		0.000	0.000	
	Stikine	0.016	0.000		0.040	0.000	
35-40	Ak. I				0.436	0.316	
	Ak. II					0.190	
	Nas-Ske				0.516	0.494	
	Tahltan				0.000	0.000	
	Stikine				0.048	0.001	
Totals	Ak. I	0.477	0.482	0.438	0.480	0.422	0.523
	Ak. II		0.244	0.406		0.240	0.293
	Nas-Ske	0.453	0.272	0.140	0.401	0.308	0.166
	Tahltan	0.056	0.000	0.004	0.109	0.024	0.015
	Stikine	0.013	0.002	0.012	0.010	0.006	0.003

[a] Ak. I and Ak. II stocks were not analyzed separately in 1985.
[b] The last figures in each column include catch from that week through the end of the season.

Appendix D.5. Estimated contributions of sockeye salmon stock groups to Alaska's District 108 drift gill net fisheries, 1986-1987.

Stat. Week	Stock Group	Catch 1986	Catch 1987	Proportions 1986	Proportions 1987
25	Alaska I	2		0.067	
	Alaska II	4		0.133	
	Nas/Ske	1		0.033	
	Tahltan	5		0.167	
	Stikine	18		0.600	
	Total	30			
26 [a]	Alaska I	1		0.071	
	Alaska II	2		0.143	
	Nas/Ske	0		0.000	
	Tahltan	3		0.214	
	Stikine	8		0.571	
	Sti. Comb.		160		0.849
	Non-Sti.		29		0.151
	Total	14	189		
27	Sti. Comb.		219		0.894
	Non-Sti.		26		0.106
	Total		245		
28	Sti. Comb.		684		0.901
	Non-Sti.		75		0.099
	Total		759		
29	Alaska I		37		0.087
	Alaska II		14		0.033
	Nas/Ske		0		0.000
	Tahltan		126		0.298
	Stikine		122		0.288
	Unknown [b]		124		0.293
	Total		423		
30	Alaska I	130		0.065	
	Alaska II	298		0.148	
	Nas/Ske	47		0.023	
	Tahltan	346		0.172	
	Stikine	1188		0.591	
	Total	2009			
31	Alaska I	20		0.029	
	Alaska II	65		0.095	
	Nas/Ske	5		0.007	
	Tahltan	38		0.056	
	Stikine	555		0.813	
	Total	683			
32	Alaska I	13		0.016	
	Alaska II	173		0.219	
	Nas/Ske	9		0.012	
	Tahltan	0		0.000	
	Stikine	593		0.753	
	Total	788			
33	Alaska I	7		0.016	
	Alaska II	99		0.220	
	Nas/Ske	5		0.011	
	Tahltan	0		0.000	
	Stikine	340		0.754	
	Total	451			
34-39	Alaska I	3		0.014	
	Alaska II	46		0.217	
	Nas/Ske	3		0.014	
	Tahltan	0		0.000	
	Stikine	160		0.755	
	Unknown [b]		4		1.000
	Total	212		1.000	
	Alaska I	176	37	0.042	0.023
	Alaska II	687	14	0.164	0.009
	Nas/Ske	70	0	0.017	0.000
	Tahltan	392	126	0.094	0.078
	Stikine	2862	122	0.684	0.075
	Stik. comb.		1063		0.656
	Non-Sti.		130		0.080
	Unknown		128		0.079
	Total	3494	1620		

[a] 1987 catch in weeks 26-28 estimated for total Stikine River fish (Tahltan and non-Tahltan Stikine) by averaging the weekly proportions of Stikine River fish in the commercial and test fishery catches in 1985 and 1986.

[b] The unknown group is comprised of age classes not digitized in week 29 and fish not sampled in weeks 34-39 in 1987.

Appendix D.6. Estimated contributions of sockeye salmon stock groups to Alaska's District 108 drift gill net test fisheries, 1985-1986.

Stat. Week	Stock Group	Catch 1985	Catch 1986	Proportions 1985	Proportions 1986
25	Alaska I [a]	22		0.198	
	Alaska II				
	Nas-Ske	0		0.000	
	Tahltan	72		0.649	
	Stikine	17		0.153	
	Total	111			
26	Alaska I	15	14	0.134	0.124
	Alaska II		0		0.000
	Nas-Ske	0	5	0.000	0.044
	Tahltan	43	81	0.384	0.717
	Stikine	54	13	0.482	0.115
	Total	112	113		
27	Alaska I	10	16	0.036	0.123
	Alaska II		0		0.000
	Nas-Ske	0	7	0.000	0.054
	Tahltan	94	95	0.335	0.731
	Stikine	177	12	0.630	0.092
	Total	281	130		
28	Alaska I	0	7	0.000	0.056
	Alaska II		12		0.095
	Nas-Ske	0	6	0.000	0.048
	Tahltan	60	79	0.213	0.627
	Stikine	222	22	0.787	0.175
	Total	282	126		
29	Alaska I	17	16	0.078	0.076
	Alaska II		13		0.062
	Nas-Ske	0	11	0.000	0.052
	Tahltan	24	60	0.110	0.286
	Stikine	178	110	0.813	0.524
	Total	219	210		
30	Alaska I		0		0.000
	Alaska II		10		0.132
	Nas-Ske		0		0.000
	Tahltan		3		0.039
	Stikine		63		0.829
	Total		76		
Total	Alaska I	64	53	0.064	0.081
	Alaska II		35		0.053
	Nas-Ske	0	29	0.000	0.044
	Tahltan	293	318	0.292	0.485
	Stikine	648	220	0.645	0.336
	Total	1005	655		

[a] The Ak. I and II standards were not separated in 1985.

Appendix E.1. Estimated contribution of sockeye salmon stocks of Tahltan and non-Tahltan origin to Canada's Stikine inriver commercial fishery, 1987.

Dates	Group	Catch by age class						Total [a]	Percent	Standard Error [b]	90% C.I. [b]	
		1.2	1.3	2.2	2.3	0.	Other				Lower	Upper
6/28-7/04	Tahltan	2	114	3	14	0	0	133	74.3	15.3	108	158
Week 27	non-Tahltan	9	28	1	4	4	0	46	25.7	15.3	21	71
	Total	11	142	4	18	4	0	179				
7/05-7/11	Tahltan	3	138	4	3	0	0	148	87.6	12.6	127	169
Week 28	non-Tahltan	16	0	2	1	2	0	21	12.4	12.6	0	42
	Total	19	138	6	4	2	0	169				
7/12-7/18	Tahltan	33	489	16	76	0	1	615	66.4	35.0	557	673
Week 29	non-Tahltan	56	171	10	26	47	1	311	33.6	35.0	253	369
	Total	89	660	26	102	47	2	926				
7/19-7/25	Tahltan	17	188	19	38	0	2	264	24.4	43.8	192	336
Week 30	non-Tahltan	140	432	32	76	130	10	820	75.6	43.9	748	892
	Total	157	620	51	114	130	12	1,084				
7/26-8/01	Tahltan	0	47	3	0	0	0	50	11.3	23.3	12	88
Week 31	non-Tahltan	83	179	21	47	55	6	391	88.7	23.5	352	430
	Total	83	226	24	47	55	6	441				
8/02-8/08	Tahltan	98	6	3	18	0	0	125	5.1	108.9	0	304
Week 32	non-Tahltan	433	1483	19	100	280	12	2,327	94.9	109.1	2,148	2,506
	Total	531	1489	22	118	280	12	2,452				
8/09-8/15	Tahltan	15	0	6	1	0	0	22	4.0	25.1	0	63
Week 33	non-Tahltan	97	329	7	25	61	8	527	96.0	25.3	485	569
	Total	112	329	13	26	61	8	549				
8/16-8/22	Tahltan	10	3	3	0	0	0	16	6.5	15.9	0	42
Week 34	non-Tahltan	42	143	4	4	30	9	232	93.5	16.5	205	259
	Total	52	146	7	4	30	9	248				
8/23-9/19	Tahltan	3	2	2	0	0	0	7	7.8	14.6	0	31
Wks 35-39	non-Tahltan	14	50	2	2	14	1	83	92.2	14.7	59	107
	Total	17	52	4	2	14	1	90				
Fishery	Tahltan	181	987	59	150	0	3	1,380	22.5	129.6	1,167	1,593
Totals	non-Tahltan	890	2,815	98	285	623	47	4,758	77.5	130.0	4,544	4,972
	Total	1,071	3,802	157	435	623	50	6,138				

[a] Weekly catch from the Canadian Department of Fisheries and Oceans, Whitehorse, Yukon.

[b] The standard errors are minimum estimates since no estimates of the variance for stocks contributing 0 fish to an age-group during a given week or for the 'other' age class are available. The 90% confidence intervals are affected in like manner.

Appendix E.2. Estimated CPUE and migratory timing of the Tahltan and non-Tahltan stockeye salmon stock groups in Canada's Stikine River commercial fishery, 1987. [a]

Stat. Week	Fishing Effort	Days	Fishing Days	Catch per Fishing Day by Stock Group: Tahltan	non-Tahltan	Total
27	15	1	15	9	3	12
28	15	1	15	10	1	11
29	17	1	17	36	18	54
30	17	1	17	16	48	64
31	17	1	17	3	23	26
32	17	2	34	4	68	72
33	17	1	17	1	31	32
34	14	1	14	1	17	18
35-39	67	2	144	0	1	1
Totals				80	211	290

Migratory Timing Estimates

Stat. Week	Proportions: Tahltan	non-Tahltan	Migratory Timing - Catch Adjusted by Test Index: Index	Tahltan	non-Tahltan
27	0.743	0.257	0.033	0.025	0.009
28	0.876	0.124	0.143	0.125	0.018
29	0.664	0.336	0.179	0.119	0.060
30	0.244	0.756	0.255	0.062	0.193
31	0.113	0.887	0.176	0.020	0.156
32	0.051	0.949	0.116	0.006	0.111
33	0.040	0.960	0.079	0.003	0.076
34	0.065	0.935	0.015	0.001	0.014
35-39	0.078	0.922	0.003	0.000	0.002
Totals	2.873	6.127	1.000	0.361	0.639

[a] Weekly catch and effort data from the Canadian Department of Fisheries and Oceans, Whitehorse, Yukon.

Appendix E.3. Estimated contribution of sockeye salmon stocks of Tahltan and non-Tahltan origin to the Stikine River test fishery, 1987.

Dates	Group	Catch by age class						Total [a]	Percent	Standard Error [b]	90% C.I. [b]	
		1.2	1.3	2.2	2.3	0.	Other				Lower	Upper
6/21-7/04	Tahltan	0	50	1	1	0	0	52	86.7	3.9	46	58
Wks 26-27	non-Tahltan	1	3	0	1	3	0	8	13.3	3.9	2	14
	Total	1	53	1	2	3	0	60				
7/05-7/11	Tahltan	2	148	1	11	0	0	162	77.5	10.5	145	179
Week 28	non-Tahltan	3	28	0	11	5	0	47	22.5	10.5	30	64
	Total	5	176	1	22	5	0	209				
7/12-7/18	Tahltan	5	131	4	24	0	2	166	57.6	14.1	143	189
Week 29	non-Tahltan	10	74	3	13	21	1	122	42.4	14.1	99	145
	Total	15	205	7	37	21	3	288				
7/19-7/25	Tahltan	4	65	5	8	0	0	82	28.0	13.8	59	105
Week 30	non-Tahltan	20	135	3	16	36	1	211	72.0	13.8	188	234
	Total	24	200	8	24	36	1	293				
7/26-8/01	Tahltan	2	20	2	1	0	0	25	8.8	8.5	11	39
Week 31	non-Tahltan	24	167	4	21	39	3	258	91.2	8.6	244	272
	Total	26	187	6	22	39	3	283				
8/02-8/08	Tahltan	2	22	0	0	0	1	25	9.3	13.1	3	47
Week 32	non-Tahltan	34	159	1	15	30	5	244	90.7	13.3	222	266
	Total	36	181	1	15	30	6	269				
8/09-8/15	Tahltan	0	0	1	0	0	0	1	0.6	10.7	0	19
Week 33	non-Tahltan	19	105	1	13	18	6	162	99.4	10.9	144	180
	Total	19	105	2	13	18	6	163				
8/16-9/12	Tahltan	0	0	0	0	0	0	0	0.0	15.1	0	25
Wks 34-37	non-Tahltan	12	59	1	8	13	9	102	100.0	15.4	77	127
	Total	12	59	1	8	13	9	102				
Fishery	Tahltan	15	436	14	45	0	3	513	30.8	31.0	462	564
Totals	non-Tahltan	123	730	13	98	165	25	1,154	69.2	31.4	1,102	1,206
	Total	138	1,166	27	143	165	28	1,667				

[a] Weekly catch from the Canadian Department of Fisheries and Oceans, Whitehorse, Yukon.

[b] The standard errors are minimum estimates since no estimates of the variance for stocks contributing 0 fish to an age-group during a given week or for the 'other' age class are available. The 90% confidence intervals are affected in like manner.

Appendix E.4. Relative run strength and migratory timing of the Tahltan and non-Tahltan sockeye salmon in the Stikine River test fishery, 1987. [a]

Stat. Week	Drifts	Catch [b]			Stock Group	
		Actual	Adjusted	Prop.	Tahltan	non-Tahltan
26	60	8	8	0.020	0.867	0.133
27	60	5	5	0.013	0.867	0.133
28	60	56	56	0.143	0.775	0.225
29	60	70	70	0.179	0.576	0.424
30	60	100	100	0.255	0.280	0.720
31	60	69	69	0.176	0.088	0.912
32	50	38	46	0.116	0.093	0.907
33	60	31	31	0.079	0.006	0.994
34	60	6	6	0.015	0.000	1.000
35	60	1	1	0.003	0.000	1.000
Totals		384	392	1.000		

Migratory Timing Estimates

Stat. Week	Proportion of In-river Run		Migratory timing		
	Tahltan	non-Tahltan	Tahltan	non-Tahltan	Total
26	0.018	0.003	0.052	0.004	0.020
27	0.011	0.002	0.032	0.003	0.013
28	0.111	0.032	0.325	0.049	0.143
29	0.103	0.076	0.302	0.115	0.179
30	0.071	0.184	0.210	0.279	0.255
31	0.016	0.161	0.046	0.244	0.176
32	0.011	0.106	0.032	0.160	0.116
33	0.000	0.079	0.001	0.119	0.079
34	0.000	0.015	0.000	0.023	0.015
35	0.000	0.003	0.000	0.004	0.003
Totals	0.341	0.659	1.000	1.000	1.000

[a] Weekly catch and effort data from the Canadian Department of Fisheries and Oceans, Whitehorse, Yukon.

[b] Catch in statistical week 32 adjusted from 50 to 60 drifts.

Appendix F.1. In-season initial and adjusted stock composition estimates for sockeye salmon harvested in Alaska's Subdistrict 106-30 drift gill net fishery, 1987.[a]

Date	Stat. Week	Initial Estimate 1.2	Initial Estimate 1.3	Initial Estimate 2.3	Adjusted Estimate 1.2	Adjusted Estimate 1.3	Adjusted Estimate 2.3
Alaska I							
6/21-6/27	26		0.533			0.849	
6/28-7/04	27	0.566	0.520	0.290	0.761	0.759	0.690
7/05-7/11	28	0.484	0.620	0.290	0.838	0.849	0.718
7/12-7/18	29	0.500	0.550	0.215	0.693	0.701	0.717
7/19-7/25	30	0.562	0.535	0.442	0.938	0.804	0.799
7/26-8/01	31	0.700	0.253	0.346	0.996	0.346	0.722
8/02-8/08	32	0.267	0.390	0.494	0.595	0.367	0.575
Alaska II							
6/21-6/27	26		0.258			0.124	
6/28-7/04	27	0.174	0.280	0.548	0.188	0.177	0.310
7/05-7/11	28	0.129	0.150	0.526	0.000	0.062	0.282
7/12-7/18	29	0.211	0.190	0.544	0.120	0.130	0.268
7/19-7/25	30	0.104	0.273	0.407	0.000	0.029	0.201
7/26-8/01	31	0.150	0.448	0.423	0.000	0.461	0.278
8/02-8/08	32	0.167	0.400	0.394	0.405	0.555	0.425
Nass/Skeena							
6/21-6/27	26		0.032			0.024	
6/28-7/04	27	0.043	0.080	0.065	0.000	0.028	0.000
7/05-7/11	28	0.242	0.160	0.039	0.162	0.089	0.000
7/12-7/18	29	0.184	0.160	0.101	0.156	0.169	0.000
7/19-7/25	30	0.167	0.101	0.035	0.062	0.081	0.000
7/26-8/01	31	0.150	0.184	0.058	0.004	0.193	0.000
8/02-8/08	32	0.200	0.100	0.042	0.000	0.078	0.000
Tahltan[b]							
6/21-6/27	26		0.129			0.003	
6/28-7/04	27		0.040	0.032		0.000	0.000
7/05-7/11	28		0.030	0.053		0.000	0.000
7/12-7/18	29		0.080	0.013		0.000	0.000
7/19-7/25	30		0.061	0.023		0.000	0.000
7/26-8/01	31		0.069	0.000		0.000	0.000
8/02-8/08	32		0.060	0.000		0.000	0.000
Stikine							
6/21-6/27	26		0.048			0.000	
6/28-7/04	27	0.217	0.080	0.065	0.051	0.036	0.000
7/05-7/11	28	0.145	0.040	0.092	0.000	0.000	0.000
7/12-7/18	29	0.105	0.020	0.127	0.031	0.000	0.015
7/19-7/25	30	0.167	0.030	0.093	0.000	0.086	0.000
7/26-8/01	31	0.000	0.046	0.173	0.000	0.000	0.000
8/02-8/08	32	0.366	0.050	0.070	0.000	0.000	0.000

[a] Age-2.2 sockeye salmon were not analyzed in-season.
[b] The number of age-1.2 fish sampled from the 1986 Tahltan escapement was insufficient to build a standard, thus the in-season models in 1987 did not include age-1.2 Tahltan fish.

Appendix F.2. Postseason initial and adjusted stock composition estimates for sockeye salmon harvested in Alaska's Subdistrict 106-30 drift gill net fishery, 1987.

Date	Stat. Week	Initial Estimate 1.2	1.3	2.2 [a]	2.3	Adjusted Estimate 1.2	1.3	2.2 [a]	2.3
Alaska I									
6/21-6/27	26	0.693	0.468	0.703	0.525	0.908	0.570	0.745	0.724
6/28-7/04	27	0.693	0.320	0.703	0.525	0.908	0.436	0.745	0.724
7/05-7/11	28	0.629	0.460	0.615	0.474	0.783	0.755	0.642	0.684
7/12-7/18	29	0.532	0.370	0.703	0.580	0.681	0.605	0.745	0.886
7/19-7/25	30	0.691	0.293	0.806	0.265	0.910	0.403	0.866	0.350
7/26-8/01	31	0.536	0.276	0.684	0.220	0.674	0.210	0.723	0.000
8/02-8/08	32	0.408	0.230	0.577	0.212	0.480	0.280	0.597	0.000
8/09-8/15	33	0.464	0.400	0.582	0.350	0.629	0.646	0.603	0.171
Alaska II									
6/21-6/27	26	0.192	0.290		0.400	0.022	0.283		0.257
6/28-7/04	27	0.192	0.480		0.400	0.022	0.438		0.257
7/05-7/11	28	0.113	0.280		0.421	0.000	0.110		0.294
7/12-7/18	29	0.170	0.270		0.230	0.010	0.192		0.000
7/19-7/25	30	0.164	0.485		0.633	0.000	0.476		0.593
7/26-8/01	31	0.244	0.414		0.710	0.126	0.562		0.933
8/02-8/08	32	0.286	0.560		0.718	0.211	0.594		0.982
8/09-8/15	33	0.099	0.320		0.600	0.000	0.248		0.797
Nass/Skeena									
6/21-6/27	26	0.115	0.048	0.297	0.050	0.070	0.000	0.255	0.000
6/28-7/04	27	0.115	0.120	0.297	0.050	0.070	0.126	0.255	0.000
7/05-7/11	28	0.258	0.160	0.385	0.079	0.217	0.131	0.358	0.015
7/12-7/18	29	0.298	0.150	0.297	0.110	0.309	0.090	0.255	0.114
7/19-7/25	30	0.145	0.141	0.194	0.082	0.090	0.121	0.134	0.057
7/26-8/01	31	0.220	0.195	0.316	0.070	0.200	0.228	0.277	0.067
8/02-8/08	32	0.306	0.130	0.423	0.056	0.309	0.126	0.403	0.018
8/09-8/15	33	0.437	0.110	0.418	0.030	0.371	0.047	0.397	0.032
Tahltan									
6/21-6/27	26	0.000	0.113		0.025	0.000	0.133		0.019
6/28-7/04	27	0.000	0.040		0.025	0.000	0.000		0.019
7/05-7/11	28	0.000	0.030		0.026	0.000	0.000		0.007
7/12-7/18	29	0.000	0.090		0.080	0.000	0.013		0.000
7/19-7/25	30	0.000	0.010		0.020	0.000	0.000		0.000
7/26-8/01	31	0.000	0.023		0.000	0.000	0.000		0.000
8/02-8/08	32	0.000	0.010		0.014	0.000	0.000		0.000
8/09-8/15	33	0.000	0.070		0.020	0.000	0.000		0.000
Stikine									
6/21-6/27	26	0.000	0.081		0.000	0.000	0.014		0.000
6/28-7/04	27	0.000	0.040		0.000	0.000	0.000		0.000
7/05-7/11	28	0.000	0.070		0.000	0.000	0.004		0.000
7/12-7/18	29	0.000	0.120		0.000	0.000	0.100		0.000
7/19-7/25	30	0.000	0.071		0.000	0.000	0.000		0.000
7/26-8/01	31	0.000	0.092		0.000	0.000	0.000		0.000
8/02-8/08	32	0.000	0.070		0.000	0.000	0.000		0.000
8/09-8/15	33	0.000	0.100		0.000	0.000	0.059		0.000

[a] Numbers of age-2.2 sockeye salmon in the escapements only to the Alaska I and Nass/Skeena systems were sufficient to construct models for this age-class, therefore the Alaska II, Tahltan, and non-Tahltan Stikine groups were not included in the age-2.2 models.

Appendix F.3. Differences between in- and postseason stock composition estimates for Alaska's Subdistrict 106-30 sockeye harvest, 1987. [a]

Stat. Week	Group	In-Season	Post Season	Change
6/21-6/27	Alaska I	65.5	43.6	-21.91
Week 26	Alaska II	9.5	21.6	12.14
	Nass/Skeena	1.8	0.0	-1.80
	Tahltan	0.2	10.2	10.01
	Stikine	0.0	1.1	1.07
6/28-7/04	Ak. I	67.4	44.9	-22.52
Week 27	Ak. II	17.0	35.4	18.42
	Nas/Ske	2.1	10.0	7.94
	Tahltan	0.0	0.1	0.14
	Stikine	3.0	0.0	-3.00
7/05-7/11	Ak. I	74.7	67.6	-7.12
Week 28	Ak. II	10.0	11.4	1.38
	Nas/Ske	5.7	11.1	5.43
	Tahltan	0.0	0.1	0.11
	Stikine	0.0	0.3	0.25
7/12-7/18	Ak. I	64.5	61.5	-3.02
Week 29	Ak. II	14.4	13.0	-1.43
	Nas/Ske	12.3	10.4	-1.93
	Tahltan	0.0	0.9	0.88
	Stikine	0.5	6.7	6.22
7/19-7/25	Ak. I	75.8	41.4	-34.36
Week 30	Ak. II	5.4	42.0	36.55
	Nas/Ske	5.9	9.9	3.99
	Tahltan	0.0	0.0	0.00
	Stikine	5.7	0.0	-5.70
7/26-8/01	Ak. I	46.6	18.1	-28.46
Week 31	Ak. II	34.8	56.7	21.93
	Nas/Ske	12.0	17.3	5.33
	Tahltan	0.0	0.0	0.00
	Stikine	0.0	0.0	0.00
8/02-8/08	Ak. I	40.6	20.0	-20.60
Week 32	Ak. II	45.2	59.4	14.19
	Nas/Ske	4.3	10.3	5.97
	Tahltan	0.0	0.0	0.00
	Stikine	0.0	0.0	0.00
	Ak. I	59.7	37.6	-22.13
Fishery	Ak. II	22.3	40.8	18.44
Total	Nas/Ske	7.9	11.7	3.79
	Tahltan	0.0	0.4	0.40
	Stikine	1.5	1.1	-0.35

[a] For age-1.2, -1.3, and -2.3 fish only.

Appendix F.4. Log-likelihood (G) values for a comparison of weekly in-season and postseason stock composition estimates for Alaska's Sub-district 106-30 drift gill net sockeye harvest, 1987.

Date and Week	Estimate	Stock Grouping					Total	G
		Ak. I	Ak. II	Nass/Ske	Tahltan	Stikine		
6/21-6/27	In	42	7	2	1	1	52	
Week 26	Post	37	19	1	9	2	67	
	Total	79	26	3	11	3	118	8.438
6/28-7/04	In	99	26	4	1	5	129	
Week 27	Post	66	52	16	1	1	135	
	Total	165	78	20	2	6	265	17.424
7/05-7/11	In	179	25	15	1	1	219	
Week 28	Post	162	28	27	1	2	219	
	Total	341	53	42	2	3	438	1.652
7/12-7/18	In	148	34	29	1	2	212	
Week 29	Post	177	38	31	4	20	250	
	Total	326	72	60	5	22	462	-12.792
7/19-7/25	In	178	14	15	1	14	207	
Week 30	Post	105	107	26	1	1	239	
	Total	283	120	41	2	15	446	93.983
7/26-8/01	In	75	56	20	1	1	153	
Week 31	Post	42	130	41	1	1	214	
	Total	117	187	61	2	2	367	33.225
8/02-8/08	In	83	92	10	1	1	185	
Week 32	Post	45	132	24	1	1	201	
	Total	128	224	33	2	2	386	20.958
	In	756	283	100	0	19	1158	
Totals [a]	Post	546	593	170	6	16	1331	
	Total	1301	875	271	6	35	2488	159.939

[a] Totals are for weighted weekly samples and thus are not direct sums of weekly samples.

Appendix F.5. In-season initial and adjusted stock composition estimates for sockeye salmon harvested in Alaska's Subdistrict 106-41 drift gill net fishery, 1987.[a]

Date	Stat. Week	Initial Estimate 1.2	Initial Estimate 1.3	Initial Estimate 2.3	Adjusted Estimate 1.2	Adjusted Estimate 1.3	Adjusted Estimate 2.3
Alaska I							
6/21-6/27	26	0.956	0.493	0.477	1.000	0.781	0.734
6/28-7/04	27	0.522	0.531	0.214	0.985	0.783	0.201
7/05-7/11	28	0.396	0.369	0.243	0.796	0.583	0.255
7/12-7/18	29	0.514	0.534	0.215	0.720	0.716	0.602
7/19-7/25	30	0.625	0.452	0.216	0.965	0.638	0.479
7/26-8/01	31	0.383	0.396	0.430	0.908	0.462	0.834
8/02-8/08	32	0.442	0.361	0.230	0.653	0.500	0.567
Alaska II							
6/21-6/27	26	0.022	0.239	0.277	0.000	0.102	0.155
6/28-7/04	27	0.217	0.198	0.429	0.000	0.121	0.475
7/05-7/11	28	0.189	0.160	0.385	0.003	0.048	0.400
7/12-7/18	29	0.167	0.228	0.544	0.040	0.160	0.328
7/19-7/25	30	0.150	0.322	0.647	0.000	0.179	0.521
7/26-8/01	31	0.255	0.380	0.370	0.000	0.420	0.166
8/02-8/08	32	0.093	0.369	0.540	0.000	0.341	0.433
Nass/Skeena							
6/21-6/27	26	0.022	0.067	0.108	0.000	0.039	0.031
6/28-7/04	27	0.174	0.125	0.143	0.015	0.096	0.136
7/05-7/11	28	0.151	0.257	0.141	0.201	0.298	0.120
7/12-7/18	29	0.167	0.140	0.101	0.121	0.124	0.070
7/19-7/25	30	0.150	0.101	0.029	0.035	0.096	0.000
7/26-8/01	31	0.085	0.139	0.040	0.092	0.118	0.000
8/02-8/08	32	0.395	0.156	0.040	0.347	0.159	0.000
Tahltan[b]							
6/21-6/27	26		0.158	0.138		0.078	0.080
6/28-7/04	27		0.099	0.089		0.000	0.029
7/05-7/11	28		0.155	0.090		0.071	0.002
7/12-7/18	29		0.041	0.013		0.000	0.000
7/19-7/25	30		0.070	0.000		0.000	0.000
7/26-8/01	31		0.037	0.030		0.000	0.000
8/02-8/08	32		0.064	0.010		0.000	0.000
Stikine							
6/21-6/27	26	0.000	0.043	0.000	0.000	0.000	0.000
6/28-7/04	27	0.087	0.047	0.125	0.000	0.000	0.159
7/05-7/11	28	0.264	0.059	0.141	0.000	0.000	0.223
7/12-7/18	29	0.152	0.057	0.127	0.119	0.000	0.000
7/19-7/25	30	0.075	0.055	0.108	0.000	0.087	0.000
7/26-8/01	31	0.277	0.048	0.130	0.000	0.000	0.000
8/02-8/08	32	0.070	0.050	0.180	0.000	0.000	0.000

[a] Age-2.2 sockeye salmon were not analyzed in-season.
[b] The number of age-1.2 fish sampled from the 1986 Tahltan escapement was insufficient to build a standard, thus the in-season models in 1987 did not include age-1.2 Tahltan fish.

Appendix F.6. Postseason initial and adjusted stock composition estimates for sockeye salmon harvested in Alaska's Subdistrict 106-41 drift gill net fishery, 1987.

Date	Stat. Week	Initial Estimate 1.2	1.3	2.2 [a]	2.3	Adjusted Estimate 1.2	1.3	2.2 [a]	2.3
Alaska I									
6/21-6/27	26	0.934	0.430	0.936	0.461	0.996	0.694	1.000	0.751
6/28-7/04	27	0.787	0.464	0.796	0.428	0.975	0.684	0.855	0.655
7/05-7/11	28	0.528	0.247	0.474	0.376	0.643	0.365	0.475	0.569
7/12-7/18	29	0.575	0.394	0.690	0.481	0.728	0.712	0.730	0.762
7/19-7/25	30	0.675	0.307	0.825	0.392	0.925	0.449	0.889	0.470
7/26-8/01	31	0.575	0.251	0.519	0.370	0.726	0.370	0.529	0.473
8/02-8/08	32	0.442	0.241	0.422	0.180	0.697	0.346	0.414	0.000
8/09-8/15	33	0.493	0.394	0.429	0.160	0.682	0.758	0.422	0.000
Alaska II									
6/21-6/27	26	0.022	0.311		0.262	0.004	0.215		0.045
6/28-7/04	27	0.043	0.266		0.304	0.000	0.164		0.142
7/05-7/11	28	0.132	0.283		0.260	0.000	0.253		0.114
7/12-7/18	29	0.258	0.321		0.316	0.142	0.171		0.117
7/19-7/25	30	0.175	0.427		0.559	0.000	0.429		0.527
7/26-8/01	31	0.255	0.524		0.570	0.139	0.518		0.527
8/02-8/08	32	0.093	0.468		0.740	0.000	0.458		0.978
8/09-8/15	33	0.145	0.276		0.770	0.000	0.096		0.989
Nass/Skeena									
6/21-6/27	26	0.044	0.110	0.064	0.154	0.000	0.091	0.000	0.084
6/28-7/04	27	0.170	0.156	0.204	0.143	0.025	0.152	0.145	0.078
7/05-7/11	28	0.340	0.299	0.526	0.182	0.357	0.342	0.525	0.125
7/12-7/18	29	0.167	0.140	0.310	0.127	0.130	0.117	0.270	0.058
7/19-7/25	30	0.150	0.121	0.175	0.039	0.075	0.089	0.111	0.000
7/26-8/01	31	0.170	0.123	0.481	0.060	0.135	0.112	0.471	0.000
8/02-8/08	32	0.465	0.177	0.578	0.070	0.303	0.196	0.586	0.022
8/09-8/15	33	0.362	0.165	0.571	0.060	0.318	0.146	0.578	0.011
Tahltan									
6/21-6/27	26	0.000	0.077		0.123	0.000	0.000		0.120
6/28-7/04	27	0.000	0.078		0.125	0.000	0.000		0.125
7/05-7/11	28	0.000	0.096		0.182	0.000	0.036		0.192
7/12-7/18	29	0.000	0.062		0.076	0.000	0.000		0.063
7/19-7/25	30	0.000	0.065		0.010	0.000	0.011		0.003
7/26-8/01	31	0.000	0.059		0.000	0.000	0.000		0.000
8/02-8/08	32	0.000	0.050		0.010	0.000	0.000		0.000
8/09-8/15	33	0.000	0.063		0.010	0.000	0.000		0.000
Stikine									
6/21-6/27	26	0.000	0.072		0.000	0.000	0.000		0.000
6/28-7/04	27	0.000	0.036		0.000	0.000	0.000		0.000
7/05-7/11	28	0.000	0.075		0.000	0.000	0.004		0.000
7/12-7/18	29	0.000	0.083		0.000	0.000	0.000		0.000
7/19-7/25	30	0.000	0.080		0.000	0.000	0.022		0.000
7/26-8/01	31	0.000	0.043		0.000	0.000	0.000		0.000
8/02-8/08	32	0.000	0.064		0.000	0.000	0.000		0.000
8/09-8/15	33	0.000	0.102		0.000	0.000	0.000		0.000

[a] Numbers of age-2.2 sockeye salmon in the escapements only to the Alaska I and Nass/Skeena systems were sufficient to construct models for this age-class, therefore the Alaska II, Tahltan, and non-Tahltan Stikine groups were not included in the age-2.2 models.

Appendix F.7. Differences between in- and postseason stock composition estimates for Alaska's Subdistrict 106-41 sockeye harvest, 1987. [a]

Stat. week	Group	In-Season	Post Season	Change
6/21-6/27	Alaska I	71.4	65.4	-6.0
Week 26	Alaska II	9.0	15.8	6.8
	Nass/Skeena	3.1	7.4	4.3
	Tahltan	6.4	1.3	-5.1
	Stikine	0.0	0.0	0.0
6/28-7/04	Ak. I	65.5	63.4	-2.1
Week 27	Ak. II	13.5	13.1	-0.4
	Nas/Ske	8.3	11.8	3.5
	Tahltan	0.3	1.3	1.0
	Stikine	1.7	0.0	-1.7
7/05-7/11	Ak. I	50.9	38.4	-12.5
Week 28	Ak. II	8.6	19.0	10.4
	Nas/Ske	24.0	28.5	4.5
	Tahltan	5.0	5.0	-0.0
	Stikine	2.9	0.3	-2.6
7/12-7/18	Ak. I	65.8	67.7	1.9
Week 29	Ak. II	15.9	15.0	-0.9
	Nas/Ske	10.9	10.3	-0.6
	Tahltan	0.0	0.8	0.8
	Stikine	1.3	0.0	-1.3
7/19-7/25	Ak. I	58.3	44.9	-13.4
Week 30	Ak. II	21.2	38.5	17.3
	Nas/Ske	6.8	6.6	-0.2
	Tahltan	0.0	0.8	0.8
	Stikine	6.0	1.5	-4.5
7/26-8/01	Ak. I	52.6	38.2	-14.4
Week 31	Ak. II	29.7	44.2	14.5
	Nas/Ske	8.1	8.1	-0.0
	Tahltan	0.0	0.0	0.0
	Stikine	0.0	0.0	0.0
8/02-8/08	Ak. I	46.5	24.9	-21.6
Week 32	Ak. II	29.3	48.8	19.5
	Nas/Ske	11.7	13.9	2.2
	Tahltan	0.0	0.0	0.0
	Stikine	0.0	0.0	0.0
	Ak. I	57.5	46.8	-10.7
Fishery	Ak. II	18.1	28.9	10.8
Total	Nas/Ske	11.9	13.5	1.6
	Tahltan	1.4	1.5	0.1
	Stikine	2.2	0.3	-1.9

[a] For age-1.2, 1.3, and 2.3 fish only.

Appendix F.8. Log-likelihood (G) values for a comparison of weekly in-season and postseason stock composition estimates for Alaska's Subdistrict 106-41 drift gill net sockeye harvest, 1987.

Date and Week	Estimate	Stock Grouping					Total	G
		Ak. I	Ak. II	Nass/Ske	Tahltan	Stikine		
6/21-6/27	In	229	30	11	21	1	291	
Week 26	Post	209	51	24	5	1	290	
	Total	438	81	35	27	2	581	19.989
6/28-7/04	In	194	41	25	2	6	262	
Week 27	Post	188	40	36	5	1	268	
	Total	382	80	61	7	7	531	-2.595
7/05-7/11	In	162	28	77	17	10	285	
Week 28	Post	123	61	91	17	2	293	
	Total	285	90	169	34	12	577	8.698
7/12-7/18	In	223	55	38	1	5	317	
Week 29	Post	230	52	36	4	1	321	
	Total	453	106	74	5	6	638	-3.590
7/19-7/25	In	200	73	24	1	21	298	
Week 30	Post	154	132	24	4	6	314	
	Total	354	206	48	5	28	612	-4.959
7/26-8/01	In	177	100	28	1	1	306	
Week 31	Post	129	149	28	1	1	306	
	Total	305	249	56	2	2	612	14.267
8/02-8/08	In	133	84	34	1	1	253	
Week 32	Post	72	139	41	1	1	253	
	Total	205	224	75	2	2	505	30.194
Totals [a]	In	1281	403	266	32	50	2032	
	Post	1042	644	301	33	8	2028	
	Total	2324	1047	567	66	57	4060	117.443

[a] Totals are for weighted weekly samples and thus are not direct sums of weekly samples.

Appendix F.9. In-season initial and adjusted stock composition estimates for sockeye salmon harvested in Canada's Stikine River commercial fishery, 1987. [a]

Date	Stat. Week	Initial Estimate 1.3	Initial Estimate 2.3 [b]	Initial Estimate 0.	Adjusted Estimate 1.3	Adjusted Estimate 2.3 [b]	Adjusted Estimate 0.
Tahltan							
6/28-7/04	27	0.846		1.000	0.888		1.000
7/05-7/11	28	0.868		1.000	0.914		1.000
7/12-7/18	29	0.691	0.690	1.000	0.704	0.795	1.000
7/19-7/25	30	0.403	0.524	1.000	0.360	0.395	1.000
7/26-8/01	31	0.312		1.000	0.260		1.000
8/02-8/08	32	0.099		1.000	0.041		1.000
non-Tahltan							
6/28-7/04	27	0.154		0.000	0.112		0.000
7/05-7/11	28	0.132		0.000	0.086		0.000
7/12-7/18	29	0.309	0.310	0.000	0.296	0.205	0.000
7/19-7/25	30	0.597	0.476	0.000	0.640	0.065	0.000
7/26-8/01	31	0.688		0.000	0.740		0.000
8/02-8/08	32	0.901		0.000	0.959		0.000

[a] Age-1.2 and -2.2 sockeye were not analyzed in-season.
[b] Age-2.3 sockeye were analyzed only during statistical weeks 29-30.

Appendix F.10. Postseason initial and adjusted stock composition estimates for sockeye salmon caught in the Stikine River test fishery and in Canada's lower river commercial fishery, 1987.

Date	Stat. Week	Initial Estimate 1.2	1.3	2.2	2.3	Adjusted Estimate 1.2	1.3	2.2	2.3
Commercial Fishery									
Tahltan									
6/28-7/04	27	0.333	0.744	0.571	0.714	0.159	0.803	0.607	0.784
7/05-7/11	28	0.333	0.897	0.571	0.714	0.159	1.000	0.607	0.784
7/12-7/18	29	0.500	0.695	0.571	0.690	0.369	0.740	0.607	0.746
7/19-7/25	30	0.294	0.360	0.353	0.429	0.110	0.304	0.375	0.329
7/26-8/01	31	0.143	0.286	0.133	0.190	0.000	0.207	0.142	0.000
8/02-8/08	32	0.353	0.130	0.133	0.320	0.184	0.004	0.142	0.156
8/09-8/15	33	0.313	0.111	0.417	0.235	0.133	0.000	0.443	0.021
8/16-8/22	34	0.357	0.143	0.417	0.235	0.189	0.021	0.443	0.021
8/23-9/19	35-38	0.357	0.152	0.417	0.235	0.189	0.032	0.443	0.021
non-Tahltan Stikine									
6/28-7/04	27	0.667	0.256	0.429	0.286	0.841	0.197	0.393	0.216
7/05-7/11	28	0.667	0.103	0.429	0.286	0.841	0.000	0.393	0.216
7/12-7/18	29	0.500	0.305	0.429	0.310	0.631	0.260	0.393	0.254
7/19-7/25	30	0.706	0.640	0.647	0.571	0.890	0.696	0.625	0.671
7/26-8/01	31	0.857	0.714	0.867	0.810	1.000	0.793	0.858	1.000
8/02-8/08	32	0.647	0.870	0.867	0.680	0.816	0.996	0.858	0.844
8/09-8/15	33	0.687	0.889	0.583	0.765	0.867	1.000	0.557	0.979
8/16-8/22	34	0.643	0.857	0.583	0.765	0.811	0.979	0.557	0.979
8/23-9/19	35-38	0.643	0.848	0.583	0.765	0.811	0.968	0.557	0.979
Test Fishery									
Tahltan									
6/21-7/04	26-27	0.471	0.852	0.571	0.545	0.332	0.944	0.607	0.515
7/05-7/11	28	0.471	0.774	0.571	0.545	0.332	0.842	0.607	0.515
7/12-7/18	29	0.471	0.619	0.571	0.625	0.332	0.641	0.607	0.642
7/19-7/25	30	0.350	0.375	0.571	0.429	0.180	0.323	0.607	0.329
7/26-8/01	31	0.261	0.209	0.333	0.250	0.068	0.106	0.354	0.045
8/02-8/08	32	0.259	0.218	0.333	0.143	0.066	0.119	0.354	0.000
8/09-8/15	33	0.160	0.103	0.333	0.062	0.000	0.000	0.354	0.000
8/16-9/12	34-37	0.160	0.044	0.333	0.062	0.000	0.000	0.354	0.000
non-Tahltan Stikine									
6/21-7/04	26-27	0.529	0.148	0.429	0.455	0.668	0.056	0.393	0.485
7/05-7/11	28	0.529	0.226	0.429	0.455	0.668	0.158	0.393	0.485
7/12-7/18	29	0.529	0.381	0.429	0.375	0.668	0.359	0.393	0.358
7/19-7/25	30	0.650	0.625	0.429	0.571	0.820	0.677	0.393	0.671
7/26-8/01	31	0.739	0.791	0.667	0.750	0.932	0.894	0.646	0.955
8/02-8/08	32	0.741	0.782	0.667	0.857	0.934	0.881	0.646	1.000
8/09-8/15	33	0.840	0.897	0.667	0.938	1.000	1.000	0.646	1.000
8/16-9/12	34-37	0.840	0.956	0.667	0.938	1.000	1.000	0.646	1.000

Appendix F.11. Differences between the in- and postseason stock composition estimates for Canada's Stikine River sockeye harvest, 1987.

Stat. Week	Group	In-Season	Post Season	Change
6/28-7/04	Tahltan	71.0	63.7	-7.3
Week 27	non-Tahltan	11.0	17.9	6.9
7/05-7/11	Tahltan	75.8	81.7	5.9
Week 28	non-Tahltan	7.1	1.2	-5.9
7/12-7/18	Tahltan	58.9	61.0	2.1
Week 29	non-Tahltan	28.5	26.3	-2.2
7/19-7/25	Tahltan	24.8	20.8	-4.0
Week 30	non-Tahltan	55.0	58.9	3.9
7/26-8/01	Tahltan	6.7	10.7	4.0
Week 31	non-Tahltan	66.9	63.7	-3.2
8/02-8/08	Tahltan	0.0	1.0	1.0
Week 32	non-Tahltan	78.0	76.0	-2.0
Fishery	Tahltan	21.4	21.2	-0.2
Totals	non-Tahltan	58.5	58.3	-0.2

[a] For age-1.3 and -0. fish in weeks 27 and 28 and age-1.3, -2.3, and -0. fish in weeks 29-32.

Appendix F.12. Log-likelihood (G) values for a comparison of weekly in- and postseason stock composition estimates for Canada's Stikine River commercial sockeye harvest, 1987.

Date and Week	Estimate	Stock Grouping: Tahltan	Stock Grouping: non-Tahltan	Total	G
6/28-7/04	In	28	5	33	
Week 27	Post	26	7	33	
	Total	54	12	65	0.335
7/05-7/11	In	53	4	57	
Week 28	Post	56	1	57	
	Total	109	6	114	1.839
7/12-7/18	In	197	94	291	
Week 29	Post	203	88	291	
	Total	399	183	582	0.299
7/19-7/25	In	81	181	263	
Week 30	Post	69	193	262	
	Total	150	375	525	1.324
7/26-8/01	In	10	91	101	
Week 31	Post	14	88	102	
	Total	24	179	203	0.884
8/02-8/08	In	1	147	147	
Week 32	Post	1	144	145	
	Total	2	291	293	0.420
Totals [a]	In	235	641	877	
	Post	232	640	872	
	Total	467	1281	1749	0.010

[a] Totals are for weighted weekly samples and thus are not the direct sums of weekly samples.